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THE PROPORTIONS
OF THE
HUMAN FIGURE

W. W. STORY.

THE PROPORTIONS OF THE HUMAN FIGURE,
ACCORDING TO A NEW CANON.

THE

PROPORTIONS OF THE HUMAN FIGURE,

According to a New Canon,

FOR PRACTICAL USE;

WITH A CRITICAL NOTICE OF THE CANON OF POLYCLETUS, AND
OF THE PRINCIPAL ANCIENT AND MODERN SYSTEMS.

ILLUSTRATED BY PLATES.

BIBLIOTHECA BODLEIANA

BY

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PREFACE.

In the present Essay on the Proportions of the Human Figure, a new system is proposed, by which the measures of all its parts may be exactly ascertained and determined without reference to the Figure itself. The first three Chapters are preliminary, and devoted to a consideration of the ancient Cabala of numbers and symbols, a critical examination of the famous Canon of Polycletus, as reported by Vitruvius, and a brief view of the principal systems of Proportion in use in ancient and modern times.

Those who are not interested in the cabalistic and critical portions of this Essay may, by beginning at the fourth Chapter, go at once to the practical part, in which the proposed Canon is fully explained.

Rome, January, 1864.

“Mirator veterum discipulusque memor,
Defuit una mihi symmetria prisca,—peregi
Quod Potui. Veniam da mihi.”

THE

PROPORTIONS OF THE HUMAN FRAME.

CHAPTER I.

THE CABALA.

In the earliest times of which we have any record, existed the Cabala, by which the secrets of nature and the mysteries of religion were expressed by occult signs, forms, and words. This was known only to the initiated; and by means of it the soothsayers, necromancers, and magians of the East professed to interpret dreams, raise spirits, and hold communion with the other world. The Cabala of the Jews is recorded in certain books written by Hebrew rabbi, and claiming to be of very ancient origin. The first Cabala containing the secrets of nature was, according to certain traditions, given to Adam by the angel Raziel, and orally transmitted from generation to generation until the age of Solomon, by whom it was first reduced to writing. According to other authorities, the first Cabala was written by Abraham, under the name of 'The Sepher Jezirah.' Others, again, assert that it was given to Moses on the mountain, together with the written law and tables, of which it was the mystical interpretation, and taught by him to his sons, Eleazar and Ithamar; but that no record was ever made of it, unless by Esdras, which is doubtful; and that it existed purely by tradition until fifty years after the destruction of Jerusalem, when the main portion was written down by a learned rabbi, Akiba, in a book entitled 'The Sepher Jezirah; or, the Book of the Creation,' additions being afterwards made by Rabbi Simeon Ben Jochai, in the book Zoar. By whomsoever it was written, this, together with a work called 'The Book of Raziel,' was in existence in the middle ages, and was believed to contain the true transcript of the Cabala, by means of which the interior and mystical meaning of the Old Testament was interpreted, apart from the apparent and common meaning of its words.

It is probable that the Cabala was originally derived by the Jews from the more learned nations of the East, and carried, perhaps by Moses, from Egypt. Certain it is that the Egyptians and Chaldeans were of all nations the most renowned for their powers as magicians, astrologers, and soothsayers; and that among the former the arts and sciences were in an advanced stage of development, while the Jews were but a wandering tribe of semi-civilized barbarians. Though the children of Israel rejected the arts of sculpture and painting, and sternly prohibited the exercise of them to their own people, yet their leaders, during their abode in Egypt, accomplished themselves in a knowledge of its mysteries, became deeply imbued by this influence, and made use of the secrets of science and magic thus obtained to impress upon the common mind a belief in the direct interposition of Jehovah on their behalf. The Greeks also were greatly indebted to Egypt for their initiation into the arcana, not only of nature and science, but also of art. Many of their chief artists and philosophers there deepened their knowledge. "Dædalus and Homer went to Egypt to study," says Diodorus. "Plato, Lycurgus, and Solon imported into their republics many laws taken from the Egyptians; Pythagoras learned from their sacred books much relating to geometry, arithmetic, and the transmutation of souls; and Democritus, in the five years he spent there, acquired much information in the science of astrology." "Pythagoras and Plato," says the learned Cornelius Agrippa, "went to the prophets of Memphis to learn magic, travelled through almost all Syria, Egypt, Judea, and studied in the schools of the Chaldeans, that they might not be ignorant of the most sacred memorials and records of magic, as also that they might be imbued with divine things." The mysteries there taught also engaged the minds of Aristoteles and other philosophers, and throughout the writings of these remarkable men is to be traced the deep influence of these studies. The germs, not only of Greek science, but of Greek art were drawn from the East; and it was only at a late period that the sculpture of Greece completely freed itself from the formalized and half-symbolical school of Egypt. The study of Egyptian art is absolutely necessary to a clear understanding of Greek art, for the latter was erected upon the foundations of the former.

The arcana of the arts and sciences are to be found in the Cabala. Whatever were the scientific canons of art in Greece, they were most probably derived from Egypt, and expressed by the Cabala; and it is therefore worth while to seek for such glimpses of this as are to be found in the ancient writings both of the Jews and of the early Greek philosophers.

In the Cabala is to be found the key to the secret meaning of certain words, signs, and numbers. As to the mystic interpretation of words we have nothing here to do. But signs, symbols, and numbers lie at the root of the whole matter of proportion and symmetry; and by a study of these we may perhaps arrive at some canon of proportion more simple, scientific, and exact than any which we at present have, and perhaps discover the long lost canons of Egypt and Greece. Unfortunately, there are only glimpses to be caught here and there; and by means of a few scattered statements, a fact or mystical number here, a sign or symbol there, we must endeavour to reconstruct a theory which perished long ago.

And first as to the Cabala of numbers—the so-called Gematria.

UNITY was not considered as a number, but the common measure and original of numbers.[*] Multiplied by itself, it produces only itself. Divided it is only multiplied into parts, each of which is unity or itself.

TWO, according to the Pythagoreans, is not a number, but a confusion of unities; as unity is God, duality is devil; and it was a superstition that this number would evoke goblins before travellers at night.

THREE, or trinity, was held to be the holy number, representing the divine nature; the conditions of existence—being, knowing, and doing, or the soul, the intellect, the body; the conditions and measures of matter—length, breadth, and thickness; and the divisions of time—past, present, and future.

The number FOUR was preferred by the Pythagoreans to all numbers. It was called by them tetraktys, and by it they swore, as in the oath in the golden verses of Pythagoras. It signifies solidity, the foundations of all things being laid 4 square. Thus, there are 4 elements, 4 corners of the earth, and 4 qualities of things—hot, cold, moist, and dry. Throughout the Old Testament this number, as we shall hereafter see, plays a conspicuous part in all that relates to the holy and mystical garments of the priest, and to the construction of the altars of incense and burnt offering In the mystical vision of Ezekiel (which is recognized as one of the theoretical Cabala), there were 4 cherubim, each with 4 faces and 4 wings; and there were 4 wheels, with 4 sides each. In the New Testament there were 4 evangelists, and 4 beasts who stood around the throne. In alchemy there are—salt, mercury, sulphur, and azoth; among hieroglyphs—the man, the lion, the bull, and the eagle; in magic—the magical Taro, and above all the mirific Tetragram.

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[*] "Unum autem quod, *μονας*, id est unitas dicitur, mas idem et fœmina est; par idem atque impar; ipse non numerus, sed fons et origo numerorum."—Macrobius, in Somnium Scipionis, lib. i. ch. 6.

The number FIVE is only remarkable as the first union of the odd and even numbers, the number 1 being reckoned as nothing; but as 2 is dual or devil, according to the Pythagoreans, 5 is an unstable and wandering number, and the originator of the pentagram, which has a remarkable significance in the evocation of spirits.

To the number SIX the title of perfection was given by the ancient philosophers and mathematicians, because, by the addition of its half, third, and sixth, it is made perfect $(1+2+3=6)$. "It is connected with production, and is the sign of the world," says Agrippa. In six days the world was made, and pronounced good or perfect. "Six days shalt thou labour," say the Commandments of Moses. The golden candlestick had 6 branches. And in the musical scale there are 6 tones (5 tones and 2 semitones). Six, however, is but the landing-place to 12, as we shall see, and only partakes of perfection in so far as it relates thereto.*

The powers of SEVEN are various. The Pythagoreans call it the vehicle of life, because it contains body and soul; body being of 4 elements—spirit, flesh, bone, and humour; with 4 qualities—choleric, sanguine, phlegmatic, and melancholic: while the soul is triple, made up of reason, passion, and desire. Here, however, it will be observed, that the 7 has no value in itself, but only as being created by the union of 4 and 3. This number plays an important part in the Revelation of St. John, and has many curious relations; as for example: the divisions of man's life are by seven; there are seven parts of a man's body; the seventh day is a critical one in disease; the moon (the seventh of the planets) observes this number in her courses. God rested on the seventh day, and made it holy. So "to seven" among the Hebrews was to swear. It is the number of purification, praise, petition, and penitence. Elijah, therefore, ordered the leper to bathe 7 times in the Jordan. "Seven times a day," says the Prophet, "I will praise Thee." There are 7 petitions in the Lord's Prayer, and the seventh year was set aside by the Jews for penitence. So there are 7 planets, 7 wise men, 7 angels before the throne, 7 openings in the head, and so on.

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* See Cab. Dogmata, a Johanne Pico, in which he gives the reasons why the number *six* is entitled to the epithet Perfect.

EIGHT is the number of justice say the Pythagoreans, for divided it forms solid halves and quarters, and it is the double of 4.* As 7 is the symbol of this life, so 8 is the symbol of eternity and the consummation of the world; therefore it is the number of blessedness: and there are 8 beatitudes given by Christ. But 8 is only valuable as it is the double of 4.

NINE is the number of the occult sciences and the highest mysteries. There are 9 orders of blessed angels; 9 spheres that sing together. At the ninth hour came the Holy Spirit to Christ, and the vail of the temple was rent. Astrologers observe 9 years in a man's life. There are 9 muses. It signifies incompleteness, wanting one to make 10, and this was the interpretation of the ten lepers given by St. Augustine.

TEN is a complete number, there being no counting beyond it except by combining it with other numbers, of which every one may be obtained out of it. The ancients, therefore, called their sacred ceremonies denary, initiation being preceded by 10 days of abstinence. There were 10 commandments, 10 instruments to which Psalms were sung, 10 chords to the Psalter, and 10 sepheroth, or spheres of the universe emanating from God. Vitruvius says that this number was held to be perfect, as there are 10 fingers or digits on the hands, which are the origin of counting and measures. But this was evidently no reason for the philosophers, mathematicians, and soothsayers, who sought out deeper and more fanciful reasons than this.

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* See Macrobius, in Somnium Scipionis, for a full account of the virtues of this number, lib. i. ch. 5.

The number ELEVEN has scarcely more significance than 1, of which it is a repetition. It only represents expectation or preparation for TWELVE, which is the number of grace and perfection, to which the highest praise is to be given. There are 12 signs of the zodiac, 12 chief joints in man, 12 apostles, 12 months, 12 tribes of Israel, 12 gates of the heavenly Jerusalem, 12 tables of the law, and so on.

This is perhaps the most mystical of all the numbers. It is produced by the multiplication of the first uneven and even numbers (1 and 2 not being reckoned mystically as numbers), $3 \times 4 = 12$, and is instantly resolved into its divine element by striking it in halves, and adding the sum of its parts, $1 + 2 = 3$. The number 4 is, as we have seen, the favourite of the Pythagoreans, and represents solidity—the world, the real; while the number 3 represented the divine element—the ideal, the spiritual.* The *addition* of these numbers makes 7, which is called the vehicle of life, because it unites the 4 elements and qualities of the body (spirit, flesh, bone, and humour, or choleric, sanguine, phlegmatic, and melancholic) with the 3 elements of the soul—reason, passion, and desire. The multiplication of these numbers creates, however, an absolute interpenetration, and when multiplied they stand together as unity and duality (12). God and the devil co-existing, or summed up, resolve themselves thus into the divine number of 3. This is neither more nor less than the mystical statement of man. He is the divine element, made solid and real, into which, as a result, comes duality, which struggles with unity, and is resolved finally into it. According to the Cabalists, the number 3 represented divine things, while the number 4 represented corporeal and human things, because they are compounded of 4 elements. Thus, the river of Eden issued from *three* fountains combined in one, say they, for *three* divine persons make one God indivisible; but leaving Paradise it divided into *four* branches, because the conditions of man on the earth are fourfold.[*] It irrigated the world from the east by grace, from the south by knowledge and piety, from the north by castigation and expiation, and by the west by benign reception. "This description of the rivers is," says Pico, "typical, by which is to be understood that there are four elements and principles, and the quadruple virtue of quadrilateral man is also indicated;" and he goes on to develop this idea at length in his 'Dogmata Cabalistarum,' as illustrated in the Oceanus of the ancient Greeks, and the chariot of Ezekiel. Also the three divine principles—Cheter Elion, Chocmah, and Binah (or Father, Son, and Holy Spirit), were enumerations of the essence of God, and were united in one; but when the divine began to communicate itself to the other inferior Sephiroth, then it divided into four heads (ghedulah, ghebura, tiphereth, and malchuth), which are represented by the tetragram, the four-lettered name, jod, he, vau, he, (יהוה), by which all things are *created*, or brought into positive existence. "In the beginning (of things) was the Word," the unpronounced tetragram of the Hebrews, which was worn on the forehead of their priests—"the sacred letters, the shuddering name of God," as Josephus calls it (*τὰ ἱερὰ γράμματα, τὸ φρικτὸν ὄνομα Θεοῦ* "), from which the Latin numen or nomen is derived, the Word and God being identical. It is this four-lettered name, the tetragram, which connects all things together, the high with the highest and the lowest—the first with the middle and the last; and the divisions, say the Cabalists, of the inferior are 12, or 4 × 3, after the manner of the zodiac, corresponding to the 12 gates of the Holy Jerusalem, and to the 12 patriarchs and apostles. A discrepancy appears, it would seem, in the number of planets, which is 7, and of the angels presiding over them; but this, say they, is merely the number created by the addition of 3 to 4, and is also, therefore, quaternian and ternian. The virtue of the tetragram is multiplied into the three-lettered name of Jesus (ישו), and diffused into the 12 apostles as into 12 signs. The tetragram, therefore, says Pico, "draws all to itself, and is like the centre of the circle; for it is centre, and circle, and sphere, embracing all things, and conducting all lines to itself."

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* "Omnium corporum tres sunt dimensiones—longitudo, latitudo, profunditas. Termini adnumerato effectu ultimo quatuor—punctum, linea, superficies, et ipsa soliditas. Item cum quatuor sint elementa ex quibus constant corpora—terra, aqua, aer, et ignis, tribus sine dubio interstitiis superantur. * * * Ex quatuor igitur elementis et tribus eorum interstitiis absolutionem corporum constare manifestum est. Ergo hi duo numeri, tria dico et quatuor, tam multiplici inter se cognationis necessitate sociati, efficiendis utriusque corporibus, consensu ministri fœderis obsequuntur. Nec solum explicandis corporibus hi duo numeri collativum præstant favorem, sed quaternium quidem Pythagorici, quem τετρακτυμα vocant; adeo quasi ad perfectionem animæ pertinentem inter arcana venerantur; ut ex eo et jurisjurandi religionem sibi fecerint. Juro tibi per eum qui dat animæ nostræ quaternarium numerum,"—Macrobius, in Somnium Scipionis, lib. i.

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[*] 'Cabalistarum Dogmata,' a Johanne Pico, 55.

This number 12 has also some peculiarities, which may be better exhibited in a diagram than explained by words.

$$\begin{array}{rlrl}
12\times 1=12 & \text{The sum of these two figures } 1+2= & 3 & \\
12\times 2=24 & \text{,,} \quad \text{,,} \quad \text{,,} & 6 & \\
12\times 3=36 & \text{,,} \quad \text{,,} \quad \text{,,} & 9 & \\
 & & - & 18=\ 9=\ 3^2 \\
12\times 4=48 & \text{,,} \quad \text{,,} \quad \text{,,} & =12=3 & \\
12\times 5=60 & \text{,,} \quad \text{,,} \quad \text{,,} & 6 & \\
12\times 6=72 & \text{,,} \quad \text{,,} \quad \text{,,} & 9 & \\
 & & - & 18=\ 9=\ 3^2 \\
12\times 7=84 & \text{,,} \quad \text{,,} \quad \text{,,} & 12=3 & \\
12\times 8=96 & \text{,,} \quad \text{,,} \quad \text{,,} & 15=6 & \\
12\times 9=108 & \text{,,} \quad \text{,,} \quad \text{,,} & 9 & \\
 & & - & 18=\ 9=\ 3^2 \\
12\times 10=120 & \text{,,} \quad \text{,,} \quad \text{,,} & 3 & \\
12\times 11=132 & \text{,,} \quad \text{,,} \quad \text{,,} & 6 & \\
12\times 12=144 & \text{,,} \quad \text{,,} \quad \text{,,} & 9 & \\
\overline{} & & - & 18=\ 9=\ 3^2 \\
936=9+3+6=18=9 & & & \text{— — —} \\
72 & & & 72=36=12^2=144 \\
36 & & & \text{or} \quad \text{or} \quad \text{or} \\
\overline{} & & & 9 \quad 9 \quad 9 \\
1044=1+4+4=9. & & &
\end{array}$$

By this diagram it is clear that this number, however multiplied, always returns to the same progression of 3, 6, 9, which are three parts out of four of itself, and the sum of these resolves itself into 9 in whatever way they are added; as 9 is the square of 3, it is plain that by multiplying the number 12 by any other number, and taking the sum of its figures, we always return to its divine element, 3.

The square of 12 and the cube of 12 also return to the square and cube of 3:—

$$12^2 = 144 = 9 = 3^2.$$
$$12^3 = 1728 = 18 = 9 = 3^3.$$

This number Twelve is also celebrated by Aristoteles and by Plato, and constantly alluded to the perfect number.

A remarkable passage occurring in the third Chap. Book VIII. of the Republic of Plato, which, says Mr. Taylor, "has baffled the ingenuity of every commentator," describes the fatal or geometric number in the following terms, of which truly, as Mr. Taylor remarks, "a literal translation is little better than nonsense."

"To that which is divinely generated," says Plato, "there is a period which is comprehended by the perfect number, whereas to that generated by man there is one in which the augmentations, both surpassing and surpassed, after having received 3 separations and 4 boundaries of things similar and dissimilar, increasing and decreasing, will render all things correspondent and rational; of which the sesquiternean root (*επιτριτος πυθμην*) conjoined with the pentad, and thrice increased, affords two harmonies; one of these the equally equal, just a hundred times as much, while the other, of equal length indeed, but of oblong shape, is of a hundred numbers from effable diameters of the pentad, each wanting one, two of which are irrational, and of a hundred cubes of the triad."

This obscure passage would certainly justify the proverb, "Numeris Platonicis nihil obscurius." Yet there have not been wanting solutions which have at least an air of plausibility. Schneider supposes the number here alluded to to be 216, *i. e.* 6^3, which is composed of three other cubes 27, 64, 125; *i. e.* 3^3, 4^3, 5^3. Baroccius, on the contrary, in an elaborate examination of this passage, contends that the *επιτριτος πυθμην* is a root or pure number, which he represents as $7 = 4 + 3$. By the last two harmonies he supposes Plato to refer to the square and cube of 12, which is made up of 7 and 5; *i. e.*, the *επιτριτος πυθμην* 7 added to the pentad 5—12 being a number often alluded to by Plato as *τελειον*, or perfect—and the dodecahedron or twelve-sided figure being, as he declares, the originator of the sphere, which is the type of the world. The fatal geometric number Baroccius considers, therefore, to be the cube of 12, or 1728, and the other harmony the square of 12, or 144.

However this may be, one thing seems to be certain, that the number having 3 separations and 4 boundaries, is that which will render all things correspondent; and thus 3 and 4, again are considered as elemental. Now either $4 + 3 = 7 +$ the pentad becomes 12, or 3×4 becomes 12.

The ancients also formerly divided their shilling into 12 parts, which took their names from their proportions to 12. Thus the fourth part, because it was a third of 12, was called triens; the third part, because it was a fourth of twelve, was called quadrans; and so on. And it was not until a later period that they used the divisions into six.

The measures of length taken from the body, and named Digitus, Uncia, Palmus, Pes, Cubitus, and Passus, were as follows:—

4 digits = 1 palm minor.
3 uncia = 1 palm minor.
12 digits = 1 palm major.
4 palms = 1 foot.
6 palms = 1 cubit.
4 cubits = 6 feet = 24 palms = 1 passus.

A passus, or double stride, being about equal to six English feet, was the height of a man. Setting out with the digit, therefore, the progression would be by four—thus, 4, 12, 16, 24; with the uncia it would be 3, 9, 12, 18; and with the palm, 4, 6, 12.

In the Old Testament, Ezekiel says (chap. xliii.), "The altar shall be 12 cubits long, 12 broad, square in the four squares thereof; and from the altar and upward shall be 4 horns." In his vision he also saw 4 cherubs, with 4 faces and 4 wings.*

But still more definitely in the Revelation of St. John this number is spoken of, and forms the ground-plan of the heavenly Jerusalem: "The great city, the holy Jerusalem" shown by the angel, had, says the apostle, "a wall great and high, and had 12 gates, and at the gates 12 angels, and names written thereon of the 12 tribes of the children of Israel.

"On the east 3 gates, on the north 3 gates, on the south 3 gates, and on the west 3 gates.

"And the wall of the city had 12 foundations, and in them the names of the 12 apostles of the Lamb.

"And he that talked with me had a golden reed to measure the city, and the gates thereof, and the wall thereof.

"And the city lieth foursquare, and the length is as large as the breadth, and he measured the city with the reed 12,000 furlongs.

"And he measured the wall thereof, 144 cubits, *according to the measure of a man*, that is, of the angel," (meaning by this the angelic man, as distinguished from the man that is beast, whose number is 666).

Again: "On either side the river (of water of life) was the tree of life which bare 12 manner of fruits, and yielded her fruit every month;" that is, 12 times.

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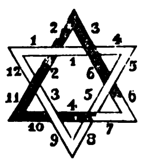
* For the interpretation of this vision, see Cab. Dogmata, p. 57.

Now here it is to be observed that the 12 gates were composed of 3 on each side, and that there were 4 sides, this is 3 × 4 = 12; and that the square of 12 is "*the measure of a man*," $12^2 = 144$. These numbers respond, therefore, to the intimations of Plato, Aristotle, Pythagoras, and Ezekiel. Let it be also kept in mind that the Apocalypse is the only mystical book of the New Testament, and written by one evidently deeply versed in the ancient mysteries.

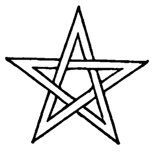
We now come to the *mystical symbols* of the Cabala, as expressed in form.

The cabalistic sign holding the supreme rank is that known as the great pantacle or triangle of Solomon, which consists of two equilateral triangles reversed upon each other, so as to touch at six points the circumference of a circle whose centre is their centre. Thus—



This is the mystical "star in the east," seen by the "wise men," or magicians and astrologers, heralding the coming of the divine man. In this figure it will be seen that there are twelve outer walls and six inner walls, and that it contains only the numbers 3, 6, 12. Its signification was of divinity, the triangle representing the trinity, or threefold chord of the divine nature, and the element 4 (representing the earthly), is only intimated by its external limits by the twelve sides, which is required as a multiplier to the divine 3 in order to create 12, or man, or the earth-God.*

The next most important cabalistic sign is the Pentagram, which is an irregular figure of confused triangles, with five equidistant parts touching the circumference of the circle, by which it is circumscribed. Thus—



This is the star of Lucifer—wandering, irregular, and satanic—and used in incantations to raise spirits. Its element is the number 5, being the first union of the dual or devil, 2, with the divine 3.

The next figure is the square, or symbolized expression of the number 4, which had the significance of solidity, establishment, law, and which by itself could do nothing, but only be and receive. The holy and mystical garments of the priests, on which were the Urim and Thummim, were compounded of the numbers 4 and 3; the ephod was of 4 colours—blue, purple, scarlet, and gold; and the breastplate, of which it was a part, was *four square*, and upon it were 4 rows of 3 different stones, so that the multiplication should make up the mystical 12—representing the 12 tribes of Israel.

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* When Christ, the "Star in the east," rose in the world, it was symbolized by this double triangle enclosed in the circle.

Next comes the cube-circle, or sphere, which Pythagoras and his followers assigned to the earth. This, according to Plato, was generated by the dodecahedron, or twelve-sided figure, which "the Deity employed in tracing the plan of the universe." To fire was given the triangle, pyramid, or Tetraedron, fire being the material representation of the divine, as illustrated in the myth of Prometheus; to the air, the Octohedron, and to water, the Ikosaedron.

"God gave the universe then," says Plato, "a figure becoming and allied to his nature, and to the animal destined to comprehend all others within himself, that figure as most becoming, which includes within itself every other sort of figure whatever. Hence he fashioned it in the shape of a sphere, perfectly round, and having its centre equally distant from the bounding extremities, as being the most perfect figure and most resembling himself." (See the Timæus, § xi., § xix., § xxix., § xliv.)

Taking this passage in connection with that already quoted, in which Plato declares that "whatever is divinely generated is comprehended or embraced by the perfect number," we shall see that 12 was this number, because the sphere being, according to him, the figure comprehending the universe divinely generated, and comprehending man as his symbol, and the sphere being, as he says, founded upon the dodecahedron, or twelve-sided figure, the expression of the sphere is 12. But Plato also declares that without light and fire, which is represented by the triangle or pyramid, the earth or sphere is incomplete, and that this combination is necessary.

These are the only cabalistic figures that need to be considered in this connection.

The laws of proportion and symmetry are thus mystically intimated by the ancients, and in the middle ages the study of the Arcana and Cabala engaged some of the most profound spirits of the time. Reuchlin, the great Hebrew scholar (born 1454), wrote a very learned work on the Cabala, which was afterwards commented on by Cornelius Agrippa, who, pursuing this track, finally wrote his remarkable work on occult sciences, 'De Occulta Philosophia,' in which may be found a curious and interesting treatise on the very matters of which we have been giving so hasty a glimpse.*

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* In the second Book 'De Occult. Philosoph.,' as well as in the pages of Macrobius in Somnium Scipionis, and of the Cabalistarum Dogmata de Johanne Pico, the recondite meanings, powers, and mysteries of numbers are elaborately discussed. If any of my readers choose to investigate for themselves the mysteries of the Cabala, they are referred to the work of Gaffarel sur le Tarot, in which the key of the mysteries of Ezekiel and the Apocalypse are given; also to a similar work by Guillaume Postel; to the 'Traité des Merveilles de la Nature,' by Goglenius, where the talismans of Solomon and the Rabbi Chael are described; to the 'Calendriers Magiques' of Tycho Brahe, and of Duchateau, where these and other talismans are engraved; and to a *résumé* of these in 'Fastes Initiatiques' of Mr. Ragon. He should also consult Brucker's 'Historia Philosophiæ,' and the 'Kabbala Denudata,' a collection of old cabalistic writings arranged and explained by Christian Knorr von Rosenroth.

CHAPTER II.

ANCIENT SYSTEMS OF PROPORTION—THE CANON OF POLYCLETUS.

We have thus seen that the laws of proportion and symmetry were mystical, and resided in numbers and symbols. They are therefore numerical and geometrical; and what at present is to be sought for is a canon which shall answer mystically to number and symbol, and be an absolute geometric statement of proportion. Pythagoras and Plato declared that the Beautiful had this exact mathematical and geometrical foundation; but it has certainly thus far never been clearly stated, or at least the key to such a system, if it ever existed, has been lost.

Numerous systems of proportion have been proposed at various periods, at which it will be well here to give a glimpse; to describe them all would require too great space, and would scarcely reward the student.

The earliest canon of which we have any record is that contained in an old Sanskrit manuscript called 'Silpi Sastri'—'Of the Fine Arts.' In this the figure is divided into 480 parts—according to the following numerical proportions:—

Hair	15
Face	55
Neck	25
Breast	55
Navel	55
Abdomen . . .	53
To Knee . . .	90
Knee itself . .	30
Leg	102
	480

According to this system the figure is not divided equally at the pubis, the upper portion of the body to the abdomen being reckoned at 258 parts, while from the abdomen to the sole is only 222 parts; thus making the legs very short and the body very long. It is curious that in the development of art the proportions of the lower limbs constantly increase. Here we have the shortest measure given by any scale. The head here, too, is but a fraction less than one-seventh of the figure.

The next canons of which we have any knowledge are those found on the walls of the temples of Egypt. These are three in number, one belonging to the ancient Pharaonic dynasty—another later than the twelfth dynasty, when Thebes began to flourish, and a third which makes its earliest appearance at the epoch of the Psammetichi.* This last canon, which differs in principle from the others, is that mentioned by Diodorus in his First Book; and it remained unaltered down to the time of the Roman emperors. By the oldest canon, which was found in a tomb at Memphis belonging to the period of about 3000 years before Christ, the height of the body is divided into 6 foot-lengths—the upper part of the head, however, rising above the sixth division. The second canon, belonging to the time of the Pharaohs, is only a modification of the first. It divides the foot-length into three parts, and these are distributed into a square which encloses the whole figure, in such a manner that the eighteen divisions reach to the eyebrows, the upper part of the head exceeding the square. The third canon described by Denon in his 'Description de l'Egypte,' divides the figure into 21 parts; the skull above the eyebrows, as in the other canons, surpassing the scale. The height is 7 foot-lengths instead of 6, each foot-length being divided into 3 parts. This is probably the same as that mentioned by Diodorus by which the figure is divided into $21\frac{1}{4}$ parts, he wrongly reckoning the head above the eyebrows as equal to $\frac{1}{4}$. In the British Museum there is a tablet on which is drawn still another canon of proportion, and belonging to the age of Amunophth III., which was about 1200 years before Christ. On this tablet are two figures, one standing and one sitting. The standing figure is enclosed within an oblong diagram divided in height into 19 squares and in breadth into 10—each square being probably intended to be one-third of a foot-length, though one foot occupies only $2\frac{1}{3}$ squares, while the other occupies 3. The divisions are 5 parts to

'Letters from Egypt, Æthiopia, and the Peninsula of Sinai,' by Dr. R. Lepsius.

the bottom of the patella, 5 to the pubis, and 9 to the top of the skull; the entire head being included. The head measures 2½ parts; the arm, from the humerus to the knuckles, 7½ parts, or 3 heads. The sitting figure has generally the same proportions, but the shoulders of this figure are one part wider than those of the standing figure, which are only a little more than 4 parts. Whether this is intended as a canon or not it is certainly very rude, and its measurements are not exact; but it was probably the work of an uneducated artist.

Here it is to be observed that these canons increase in their divisions from the earliest. The first is divided into 6 parts, the second into 18 parts, the third, which is that of the British Museum, into 19 parts;—but as in this the 19th part is added only to contain the head above the eyebrows, it corresponds with the second canon—and the 4th is divided into 21 parts. And Diodorus gives us still another divided into 21¼ parts. He, as has been stated, may have added the quarter part as the representation of the upper parts of the head; but, in point of fact, the head above the brow would occupy more than a whole part, so that, unless he has made a plain mistake, his canon is not identical with the third, and contains at least 22 parts.

It was from the Egyptians that the ancient Greeks undoubtedly derived their original standard of proportion. It is to Egypt that the formal and rigid divisions of all the early Greek and Etruscan statues plainly point; and it was not until a comparatively late epoch that the Greek school emancipated itself from its formality. But art in Greece was destined to attain a freedom beyond its hieroglyphic limits in Egypt, and to break forth from the constraint by which it was there swaddled and impeded. The fixed and rigid figures began to move and live; and Phidias completely emancipated sculpture from the stone, in those grand and simple figures in which nature and art, the ideal and the real, met and fraternized with a noble dignity. But the scientific rule was never lost sight of—law kept pace with freedom—and science, pursuing imagination, insisted upon its rights. It was to the genius of Polycletus that we owe the celebrated canon of proportion which made him famous for ever. By this canon, the rule of proportion was established on an absolute geometric and scientific basis.

Pliny says: "Polycletus Sicyonius, Ageladæ discipulus Diadumenum fecit molliter juvenem, centum talentis nobilitatum. Idem et Doryphorum viriliter puerum. Fecit et quem canona artifices vocant, lineamenta artis ex eo petentes velut a lege quadam; solusque hominum artem ipse fecisse artis opere judicatur. Hic consumasse hanc scientiam judicatur, et toreuticem sic erudisse ut Phidias aperuisse. Proprium ejusdem, ut uno crure insisterent signa, excogitasse—*quadrata* tamen ea esse tradit Varro et penè ad (unum) exemplum."*

There has been some difference of opinion in the interpretation of this passage, as to whether Pliny is to be understood as stating that the Doryphoros (or lance-bearer) was in itself the canon, or whether another statue made by him was the canon, or whether there was a canon independent of any figure. Sometimes it is printed without a period after "puerum," and then it may be translated, "He made the Doryphoros a youth of manly proportion, and which artists call the canon;" or, "He made the Doryphoros, and that which the artists call the canon," referring to another statue, or at least distinguishing the canon from the Doryphoros—for it will be observed that he says, "*Et* Doryphorum viriliter puerum fecit *et* quem canona artifices vocant." The real meaning apparently is, that he made the Doryphoros, and that thing which the artists call the canon; and the probable solution of the sentence is, that he invented a canon which was a scientific and geometric rule of proportion, according to which the Doryphoros was made. This would render the rest of the passage quite intelligible; for to this canon, artists, he says, referred, in making their works as to a *law*, "velut a lege quadam;" and he adds: "Hic consumasse hanc *scientiam* judicatur et toreuticem *erudisse*." He was judged to have reduced art thus to a science, and to have made sculpture erudite. To this interpretation the learned Dr. Brunn, in his 'Geschichte Griech. Künstler,' also seems to incline. Certainly making a well-proportioned figure would not be creating a scientific canon; and unless it were made according to a certain standard of proportions independent of it, it is difficult to understand why Polycletus should have been celebrated as the inventor of a canon of proportion; since other sculptors before him had made equally well-proportioned statues; and among these may be instanced a statue of Athene, by Phidias, to which the epithet "Kallimorphos" was given on account of its beauty of form. The Doryphoros was undoubtedly an expression of the canon, but the canon was a scientific rule or law, independent of it; otherwise how could he be said to be the only artist who "exhibited art itself in a work of art?" ("artem ipsam fecisse artis opere"); that is, who embodied his theory in an actual work. Certain passages in the writings of Galen* and of Lucian,† in which this canon is spoken of, bear out this interpretation. One passage of Galen, in particular, is inconsistent with any other supposition, and directly mentions a book in which Polycletus lays down the doctrine and laws of proportions established by his canon. After speaking of certain laws of symmetry, and saying that beauty grew out of an exact relation of parts, he continues thus: "Just as by the norma or canon of Polycletus it is seen set forth in words; for after Polycletus in that book had taught the proportions of the body, he confirmed his discourse by his work, by making a statue according to the precepts of his book, which he called by the same name as his book, norma or canon."‡

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* The word "unum" is omitted in some editions, and in this case the meaning of this phrase evidently would be, that the works of Polycletus were "close to the model," or accurate copies of nature, or "after *his* model" or canon. Quintilian says (v. 12, 21), "At vero statuarum artifices pictoresque clarissimi cum corpora quam speciosissima fingendo pingendoque efficere cuperent nunquam in hunc incidunt errorem ut Bagoam aut Megabyzum aliquem in exemplum operis sumerent sibi, sed Doryphorum illum aptum vel militiæ vel palæstræ."

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* "Laudantque homines quandam Polycleti statuam, canonem appellatam, inde adeo id nomen sortitam, quod partium inter se omnium competentiam ad unguem habeat."—De Temperamentis, lib. i. ch. 9. Men praise a certain statue of Polycletus called the canon, which name is derived from the fact that all its parts are exactly related to each other to a nail. This phrase, "ad unguem," was a favourite one with Polycletus. To him is attributed the saying that "a work becomes more difficult when it is finished ad unguem," by which I suppose he means finished with exactness, as we say, "to a hair's breadth;" or, perhaps, according to a precise measure or rule; since, literally, the expression "finished to the nail" would have no peculiar significance, the nails being expressed even in the rudest statues. The length of the nail itself was probably the smallest measure, after which came the digit, the palm, the cubit, and so on; or it may have been half the uncia—"ad unciam" and "ad unguem" being equivalent terms.

† Lucian says: "As to the body, it seems to me that it should be according to the canon of Polycletus, neither too slender and beyond measure long, nor short and dwarf-like in character, but of a just and exact measure, neither over fleshy, nor thin to excess."—De Salt. 75.

‡ Pulchritudinem vero non in elementorum sed in membrorum apta congruentia, digiti, videlicet, ad digitum, digitorumque omnium ad palmam, et ad manus articulum, et horum ad cubitum, cubiti ad bracchium, omnium denique ad omnia positam esse censet, perinde atque in Polycleti norma literis mandatum conspicitur. Nam cum omnes in eo libro congruitates corporis Polycletus docuisset, opere demum orationem confirmavit, juxta libelli præcepta statua fabricata, quam eodem nomine quo librum inscripserat normam appellavit.—De Hippoc. et Platon. decretis, lib. v. ch. 3. See also Galen, De optimi nostri Corporis Constitutione, lib. i. Ælian, lib. xiv. ch. 8.

The term "quadrata," quoted by Pliny from Varro as applicable to this figure, seems also to denote something geometric. I am well aware that this term, as afterwards used by Suetonius,* Galen,† and Celsius,‡ would seem to indicate a *medium* figure; but this was probably its secondary meaning, derived from the fact that the Doryphoros was a medium figure, though squared (quadrata) according to the canon of Polycletus.

That some absolute standard or canon, derived from Egypt, was already known and used in Greece, however unsatisfactory it may have been, is manifest from a passage in Diodorus (i. 98), who relates that he had it from certain Egyptian *priests*, that two Greek artists from Samos, named Telekles and Theodoros, who lived between the 50th and 60th Olympiads, brought over from Egypt a certain rule of proportion, by which they were enabled, the one at Ephesus and the other at Samos, to make each a half of a statue of the Pythian Apollo; and so exactly did this canon enable them to execute it, that when the halves, thus separately made, were brought together and joined, they matched precisely in every part, and appeared to be the work of one artist.

That the Egyptians possessed a canon of an exact and geometric character is also plain from the following passage at the end of the First Book of Diodorus:—

"The Greeks," he says, "had no knowledge of this kind of art, though the use of it was perfectly known to the Egyptians. For the Egyptians did not measure with the eye the composition of their statues, but with measures; so that out of many various blocks, worked according to an exact and fixed measure, they brought the statue to its perfection. And what may be called truly wonderful is, that various artists in different places should, upon a certain and established measure, compose a single statue in twenty and sometimes in forty pieces which would all exactly agree."

We have already seen that this standard, whatever it was, steadily increased in its relative parts or squares from 6 to 18, and then to

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* Life of Vespasian.—"Statura fuit quadrata, compactis firmisque membris."

† "Eusarchos sive quadratus est homo," says Galen, De Temperamentis, lib. i. ch. 9, speaking of this canon. See also 'De Usu partium Corp. Hum.' lib. vii.

‡ "Corpus autem habilissimum quadratum est, neque gracile neque obesum." Lib. ii. ch. 1.

21 and 22 in Egypt, and the same tendency appears in Greece under the system of Polycletus; since, according to the Egyptian standard, the length below the pubis was reckoned as one part more than that above, while in the Greek the body is here divided into two equal parts.

But even the most cursory examination of the ancient statues clearly shows that they possess a certain and geometric character, as if they were made according to some mechanical scale of proportion. It is this geometric, and, so to speak, squared character (for no better term can be applied to them than that used by the ancient writers—*quadrata*), which at once distinguishes them from all modern statues, in which, whatever be their merits, the figure is represented, not according to an established formula, by which the muscles are exactly and formally distributed, but by the direct imitation of nature or individual models. One is executed according to law, the other is not. Whatever may be the defects of any antique statue, however rude its design and workmanship, it will always be found to conform, in its general distribution of parts, in a remarkable way, with the best works. Between the rudest and the most finished statues there is a certain common quality which modern statues do not possess. This is very strongly impressed upon all the early Greek and Etruscan works, though it is less evident in the later Roman works, when portraiture and the representation of individuals took place in a great measure of the ideal and heroic types of Greece. As art declined in Rome, the canons of Greece were less studied and understood, the ideal character was lost, and the Egyptian Antinous of the time of Hadrian would seem to have been an attempt to re-embody the old canon.

The canon of Polycletus remained the recognized standard of medium form of the "statura quadrata." But there is always a tendency to excess, and this exhibited itself in the attempt of Euphranor to give more length still to the proportions thus established. His works are characterized by Pliny (xxxv. 129) as being slenderer in the totality of the figure, and with larger heads and limbs ("in universitate corporum exilior, capitibus articulisque grandior"). Lysippus seems to have carried out the systems of Silanion and Euphranor, of lengthening the figure; but he reduced the size of the head, while he made the bodies more delicate and slender than those of

Polycletus ("capita minora faciendo quam antiqui; corpora graciliora siccioraque."—Pliny, xxxix. 6). These changes show that the tendency was to lengthen the figure and necessarily to increase the divisions.

Lysippus, however, plainly recognized the scientific canon of Polycletus, and even called the Doryphoros "his master," * though in some respects he endeavoured to improve upon it, as Pliny gives ample warrant for stating, did we not know it from his works. Speaking of Lysippus, he says: "Non habet Latinum nomen symmetria, quam *diligentissime custodivit,* nova intactaque ratione quadratas veterum staturas permutando; vulgoque dicebat, ab illis factos quales essent homines; a se quales viderentur esse." He strictly observed symmetry (by which is meant the exact relation of measures and proportions), varying the quadrated figures of the ancients by a new and hitherto unattempted rule ; and saying that the ancients made men as they were, and that he made them as they seemed to be. By this he undoubtedly meant, that, instead of closely adhering to any actual model, he made his statues according to a system by which he sought to produce the effect of nature in figures wholly ideal in character—not representing them literally as they are in fact, but as they are to the imagination.

That the criticism of Pliny upon his works is correct, is manifest from copies of some of his statues which have come down to us, among which may be mentioned that of his famous statue of the Athlete with the Strigil, called the Apoxyomenos, and now in the Vatican. This figure is drawn out in its proportions, small in the head, slight in the body, long in the limbs, and wanting the massive quadrate grandeur and harmonious dignity of Phidias, as well as the manly and compact proportions of Polycletus. In a word, the attempt of Lysippus was to idealize his figures, by exceeding the rule of nature in his proportions, for the sake of a certain effect of lightness and sinewy elegance. The result is that his works, striking as they are, appear exaggerated when compared to the best works of an earlier period. Our object is not here, however, to discuss the style of Lysippus save as relating to proportions, for this would afford room for a study by itself.

The canon of Polycletus has, however, been lost, and with it the Doryphoros, which was its practical embodiment. The only vestige of it that we possess is to be found in the pages of Vitruvius, who, writing on the subject of architecture, gives us incidentally a confused account of some of its principal features. It is more than doubtful whether he really understood the canon, as he was not a sculptor, and would have had little practical need to study it; and writing, as he did, at the beginning of the Christian era, when art was already on the decline, it is quite probable that it was ill understood at Rome, and known there, even to artists, only in its general and practical features and by tradition. His report, however, manifestly inaccurate and incomplete as it is, contains all that we know of this famous canon, which Pliny declares to have been the greatest work of Polycletus.

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* Cicero, Brutus, 86, 296.

The report of Vitruvius is as follows:—

"Nature has so composed the human body, that the face, from the chin to the top of the forehead where the hair is rooted, is a tenth part of the whole height. The open hand, from the wrist to the extremity of the middle finger, is the same. The head, from the chin to the top of the skull, is one-eighth; the same to the pit of the neck (imis cervicibus). From the top of the breast (ab summo pectore) to the beginning of the hair on the forehead, one-sixth; and to the top of the skull, one-fourth. Of the whole length of the face, one-third is from the chin to the lower nostrils; one-third from the nostrils to between the eyebrows; and one-third thence to the roots of the hair where it begins on the forehead. The foot is one-sixth of the entire height; the cubit (*i. e.*, from the elbow to the end of the middle finger) is one-fourth; and the shoulders across the chest (by 'pectus' this must be meant) also one-fourth.

"The other members have also their common measure of proportion (commensus suos proportionis), by the use of which the greatest of the ancient painters and sculptors have won great and infinite praise. In a similar way, between the members and the total mass of a temple are certain determined rules of proportion.*

"So, also, the navel is the natural centre of the body; for if a man be placed supine, with his hands and feet spread, and the navel be taken as the centre of a circle, the circumference would touch the extremities of the fingers and feet.

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* This would seem to indicate a certain rule of geometrical proportion, founded, not upon an empirical statement, but upon a scientific basis.

"As the scheme of a circle is found in the body, so also is the scheme of the square (quadrata designatio in eo invenitur); for if the measure be taken from the soles of the feet to the top of the skull, and applied to the hands outstretched on either side, it will be found that the width and height are equal, so as to form a perfect square."

Vitruvius then proceeds to apply these rules of proportion to architecture, and concludes with this sentence:—

"The standards of measurement (mensurarum rationes) applicable to works of every kind are deduced from the members of the body, as the digit, the palm, the foot, and the cubit, all of which are distributed according to the perfect number, which the Greeks called Teleion (τέλειον). The ancients called the number 10 perfect, because the number of fingers on the hands is 10, and the palm is deduced from the fingers, and the foot from the palm."

This is all the light that Vitruvius throws upon the canon of Polycletus. So confused, careless, and imperfect is his report, as plainly to show that he did not understand the system he here assumes to describe. The measurements he gives are 11 in number, and of these 3 are manifestly wrong.

1st. "The head, from the chin to the top of the head, is," he says, "one-eighth, and the same from the pit of the neck or fontanella." This, of course, is impossible; the measure from the chin to the scalp must be less than that from the pit of the neck to the scalp.

2nd. He says: "From the top of the chest to the top of the forehead is one-sixth." If, as he says, the figure is eight heads high, this measurement is plainly wrong. Instead of being one-sixth it is one-seventh.

3rd. He says: "The foot is one-sixth part of the whole height," which is manifestly too long.

His last sentence only confuses all that he has previously said. He here asserts that the standards of measurement are deduced from the members of the body—the digit, palm, foot, and cubit, distributed according to the perfect number "teleion." And he adds that this perfect number is 10. Now, in point of fact, these measures were by the Greeks distributed into 3, 4, 6, 12, 24, 96, and not into 10 or multiples of 10. Thus, as we have seen—

4 digits = 1 palm minor.
12 digits = 1 palm major.
6 palms = 1 cubit.
4 palms = 1 foot.
6 feet = 1 passus.

Besides, the divisions of the body he has hitherto given are into thirds, fourths, sixths, sevenths, eighths, and only one is into a division into 10ths, which he says is the perfect number by which all the measures are distributed. Here is a strange discrepancy between his theoretical or scientific method and his practical method. The measures he gives do not correspond to the scale.

The real fact is, that the number called teleion, or perfect, by the Greeks was not 10, but 12, and this, as has been shown, embraces the 3, 4, 6, 12, and 24 of the absolute scale of measurement adopted by them, and subdivided into digit, palm, foot, cubit, and passus. Vitruvius made the blunder by considering the actual number of digits or fingers in the actual hand as the base of the scale, whereas the scale is not at all founded on the ten fingers, but on a purely ideal system.

In a sentence immediately following that in which he incorrectly asserts ten to be the perfect number of Plato by which the figure is measured, he goes on to say that the mathematicians, on the contrary, assert the number six to be perfect; and after giving their reasons for this, he thus continues:—" In like manner as the foot of a man is one-sixth of his height (repeating his previous error), so as the number six completes the height of the body, it was considered to be perfect, and the cubit was estimated at six palms or twenty-four digits." The sentence in itself is very confused in its construction, but one thing clearly results from it, and that is, that the number by which the body was divided was not ten, as he had previously stated, but four and six—four cubits, six palms, or twenty-four digits.

The inference which I draw from all these contradictions is, that the scale of measure indicated in this last sentence, as founded upon the digit, palm, foot, and cubit, when distributed, not according to their actual number but according to the perfect number (τέλειον), is the true scientific scale; that the proportions given by Vitruvius were originally established thereon; but that the geometrical or absolute canon being lost, a new and arbitrary mode had been substituted, which is merely proximative, and not scientific and geometric.

The key of the whole system of Polycletus then, as it would seem, is to be found in the first branch of this last sentence of Vitruvius; and to the scale therein indicated all the previous divisions stated by him empirically and without rule and reason will be found to correspond, because for the most part, however unscientifically stated, they are accurate in themselves.

Leonardo da Vinci was evidently of this opinion. In the diagram of proportions made by him in illustration of the canon of Polycletus, he begins by translating this clause; though in every edition of Vitruvius it follows the statement of proportions. And at the bottom of the diagram he has marked the true scale of 4 digits = 1 palm, 4 palms = 1 foot, 6 palms = 1 cubit, and 24 palms = 1 passus, according to which he subdivides the figure. On the passus he then erects a square, in which he encloses the figure with its arms spread, the feet, the top of the head, and the extremities of the fingers touching the square, the centre of which is the pubis.

He also encloses the figure in a circle, of which the navel is the centre, by extending the legs so as to diminish the height by one palm or 1-24th, and elevating the arms so that the middle finger is on a level with the top of the head. In this way the legs from the pubis just equal the base, and with it make an equilateral triangle.

In some of the old editions of Vitruvius the passage relating to the canon of Polycletus is illustrated by engravings in which the human figure is represented in various diagrams, thus showing the importance attached to the statement of Vitruvius relative to the circle and square. The manner of enclosing the figure in the circle and square is however, different from that employed by Leonardo da Vinci, the navel being the centre of the circle within which the square is inscribed, the figure being spread out so that the two feet and two hands occupy the corners and touch the circumference. In others the figure is erect, the square being drawn diamond-wise in the circle, the head occupying the upper angle, the feet the lower angle, and the two outstretched hands the other angles. To these sometimes are added the hexagon, and the double inverted triangles with various mystical signs and indications.

The application of geometric diagrams to the human figure engaged the attention of several of the most distinguished men of the middle ages. Giovanni Zahn, in his 'Libro della Specula Physico Mathematico Historico,' explains how the figure can be drawn in a circle, square, pentagon, and equilateral triangle. Cornelius Agrippa, also, in his 'Occulta Philosophia,' gives us drawings of the figure enclosed in various geometrical diagrams, some of which are very curious. Thus, in one of these drawings, the figure is enclosed in a pentagram, the five points of which corresponding to the head, two feet, and two hands, touch the circumference of a circle of which the centre is the pubis. The hands are extended on a level with the waist, and the legs are spread. In another drawing the figure is represented in a square, the arms elevated above the head to their utmost extent, and the feet and hands touching the boundary of the square. A diagonal is then drawn through the centre of the diameter of the square, which is subdivided into four smaller squares, and each square into four equilateral triangles, the centre point of all being the navel.

The number of systems of proportion since proposed is very large, and in the next chapter a brief account will be given of some of the principal ones.

CHAPTER III.

MODERN SYSTEMS OF PROPORTION.

AMONG the most prominent of the more modern systems of proportion are those of Giotto, Ghiberti, Bramante, Congiaso, Alberti, Michael Angelo, Raffaele, Rosso de Rossi, Pietro de Cortona, Cardanus, Pomponio Gaurico, Philander, Armenini, Barbaro, Mascagni, Lomazzo, Juan Valverde de Hamusco, Felipe de Borgona, Gaspar Becerra, and Marc Antonio della Torre, among the Spanish and Italians; Jean Cousin, Gerdy, Audran, N. Poussin, Watelet, Jombert, H. Vernet, Salvage, Montabert, Fau, Jomard, Quetelet among the French and Belgians; Albert Durer, Vesalius, Van Hoogstraeten, Lichtensteger, Camper, Preissler, Lavater, Schmidt, Zeising, Schadow, Elster, Perger, and Carus, among the Germans and Netherlanders; and Flaxman, Knox, Hay, and Gibson among the English.

The system proposed by nearly all these writers is fundamentally different from that of Polycletus as interpreted by Leonardô da Vinci. This remarkable man, whose eyes looked everywhere, and whose mind sounded so many depths of art and science, seems to me to have alone hit upon the true principle which lies at the centre of proportion. With few exceptions all others have sought to find a measure of proportion in some member of the body, taking either in the foot, the head, the hand, the arm, the nose, the face, and measuring all other parts thereby. The result of all these systems is nearly the same. Those who take the head as the common measure, divide the figure into 7½ or 8 heads, or 10 faces, and divide again the head into 4 parts. Those who take the foot divide the body into 6 or 7 feet. Thus Alberti, taking the foot, divides it into 10 *gradi*, and each grado into 10 minuti, making the total height of the figure 6 feet lengths. Cardanus makes the height 7½ heads, and divides the head into 24 parts.

Cousin divides the figure into 8 equal parts, of which one-eighth is the head. Gerdy follows this division with slight differences: Flaxman does the same, as does also Fau. Gaurico divides the figure into 9 faces. Jombert takes the nose as the unit of measure, and divides it into 6 parts. Salvage takes the foot or head, making the height 6 feet, or 8 heads. Montabert divides the height into 100 parts, making the face 10 parts. Lavater and Preissler make the figure 10 faces or 8 heads. Hoogstraeten divides the body into 15 or 16 parts, making $7\frac{1}{2}$ or 8 heads. Lichtensteger divides it into 68 parts, making the head $8\frac{1}{2}$ parts.

Claude Audran in 1683 published a work containing the measurements of some of the chief statues of antiquity, and upon these he founded a system which in no respect differs fundamentally from those of which I have spoken. The principal value of his work resides in the measurements of the antique which it contains. He takes the head as the unit, dividing it into 4 parts, and each part into 12 minutes. The results of some of his measurements are as follows:—

	Heads.	Parts.	Minutes.
Laocoon	7	2	3
Farnese Hercules . .	7	3	7
Antinous	7	2	—
Greek Peace . . .	7	2	—
Venus de' Medici .	7	3	—
Apollo Belvidere . .	7	3	6

Of course it is to be taken into consideration that none of these figures are completely erect, and that the ideal length or actual length are not, therefore, exactly given in these tables: for if a figure is 8 heads high when perfectly erect on both feet, it will lose materially in its height the moment that it stands on one foot.

Simone Stratici, in his richly annotated edition of Vitruvius, published at Udine in 1827, says, in a note to the first part of the third Book, that the Farnese Hercules measures from the top of the head to the chin, $8\frac{37}{144}$, or a fraction more than $8\frac{1}{9}$; the Apollo Belvidere $8\frac{10}{72}$; and the Venus de' Medici $7\frac{52}{72}$. The head of the Venus de' Medici is, however, notoriously too small for the body. These differences of measurement show how extremely difficult it is to ascertain the exact size of the head, and therefore how vague it is as a unit of measurement.

J. Ch. Elster in 1853 published also a work on proportion, dividing, as usual, the body into 8 heads or 10 faces: and further, he declares that there are 3 equal measures in every figure, viz., 1st, from the beginning of the sternum to the bottom of the abdomen; 2nd, from the navel to above the patella; 3rd, from the beginning of the patella to the sole; and in illustration he gives the following measures from the antique, divided into heads, parts (4), and each part minutes (12). Thus:—

	Sternum to Abdomen.			Navel to Knee.			Knee to Sole.		
	Heads.	Parts.	Minutes.	Heads.	Parts.	Minutes.	Heads.	Parts.	Minutes.
Borghese Achilles	2	1	7	2	1	7	2	0	9
Faun of Capitol	2	1	9	2	2	9	2	1	9
Farnese Hercules	2	2	5	2	2	9	2	2	9
Apollo Belvidere	2	1	4	2	1	5	2	1	9
Colossos of Monte Cavallo	2	2	5	2	2	11	2	2	5

These measures, however, seem not to carry out his statement, except in a very proximative way, there being in one case a difference of a quarter of a head. Thus, in the Borghese Achilles there is a difference of nearly a quarter of a head between the first or second and third measures; in the Faun a difference of a quarter of a head between the second and first or third measures; and in no one case do the three measures exactly correspond. Now in a figure of six feet a difference of one-fourth of a head is a difference of more than two inches.

J. G. Schadow, in his 'Polyklet,' has given us a system which in no fundamental respect differs from those already adverted to, though it is interesting and valuable. He divides the figure according to the Rhenish measure of 12 inches to a foot, and 8 lines to an inch, making the full height of a medium man 5 feet 6 inches, or 66 inches, and giving to the head 9 inches, to the face 7, to the foot 10, to the upper arm 14. The heroic proportion he states at 70 inches, giving to the head 9 inches.

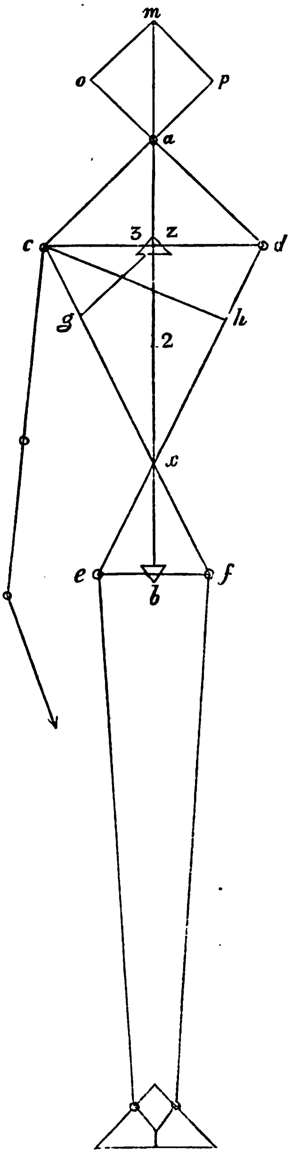
Flaxman, though he alludes to the proportions given by Vitruvius, and draws his figure with arms extended in a square, merely gives certain dry statements of length, and does not pretend to investigate fundamentally the law of proportion. He states the figure as 8 heads or 10 faces, according to Vitruvius, divides the head into 4 parts, and the figure into 4 parts, and says that there are certain spaces or lengths equal to each other, viz., 1st, from the top of the shoulder to the elbow, and thence to the knuckles = 6 noses. 2nd, from the acromium to the crest of the ilium, thence to the patella, thence to under the internal malleolus, are equal spaces. 3rd, from the summit of the head to the pit of the breast, thence to the pubis, thence to below the knee, and thence to the sole are equal. These, with a few widths and breadths, are all his proportions.

Thus, all, or nearly all, take a head, a foot, a nose, or some other member of the body as a unit, dividing it into a certain number of parts, and applying it as a measure of the whole body. Their systems are always fundamentally the same, though with many changes and differences as to the exact dimensions of particular portions of the body. They are the result of attempts to discover the relation of parts of the body to each other, not according to a geometrical or scientific standard exterior to the body and independent of it, but by applying one part to the other. The parts almost universally taken are the head, the face, and the foot.

Michael Angelo divides the figure into 8⅐ parts; that is, calling the head 7 parts, he would make the whole height 57 parts. But he does not apparently measure from the head, face, or foot; and his divisions of length are 2, 4, 6, 12. Whether these divisions were purely arbitrary, or founded on some secret law which he does not explain, cannot be determined; but a remark made by him to one of his scholars, Marco di Siena, and recorded by Lomazzo, would seem to indicate that this scale was founded upon some geometrical and arithmetical rule. "A figure," he says, "must always be pyramidal, serpentine, and multiplied by the numbers 1, 2, and 3."

Other methods of proportion have been suggested, and argued with elaboration and ingenuity, which differ essentially from these arbitrary schemes of measurement, and are scientific and geometric in character. Among these may be mentioned the systems of Carl Schmidt, C. G. Carus, A. Zeising, D. R. Hay, and John Gibson.

Mr. Schmidt proposes a scheme founded upon the skeleton. He draws a line, *a b*, from the bottom of the spine (os cocygis) to the top of the spine, where it joins the skull. This he divides into four parts, the first of which establishes the navel, (*x*) the second, the top of the ribs; the third, the middle point of the sternum (*z*); the fourth, the end of neck where it joins the skull (*a*).



Upon this line *a b* he constructs his proportions in this wise;—through the third point (*z*) he draws a horizontal line (*c d*) equal to $\frac{1}{2}$ *a b*, intersected by *a b* into two equal parts (*c d*), showing the os humerus. At the base of the line *a b* he draws another horizontal line (*e f*) = $\frac{1}{2}$ *a b*, and divided thereby into two equal parts, and showing the thigh heads. He then draws diagonal lines from the opposite points of *c d* and *e f*, so as to cross each other at *x*.

From *c* and *d* above he draws two lines diagonally crossing at *a*, the fourth division of *a b*, extending it beyond that half its length, and of this surplus making a diamond or square, set edgeways on the top of *a*, and this is the head of the figure.

He then draws a line (*z g*) parallel to *a c*; and from the point *g*, representing the nipple, draws one line to *e* (the right hip) and one to *f* (the left hip). This first line is the length from the hip to the knee, and the second the length from the knee to the ankle.

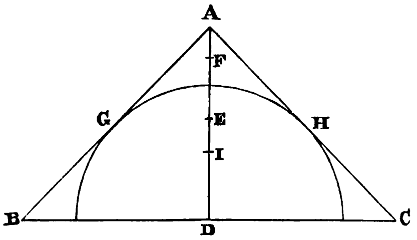
From *c* he then draws a line to *h* (the left nipple), and this is the length of the upper arm to the elbow; from *g* to *x* (*i. e.*, from the nipple to the navel) he again draws a line, and this is the measure of the fore-arm to the wrist, and *x e* = hand.

The accompanying diagram will give a clearer notion of this system than any explanation.

C. G. Carus, in his 'Symbolik der Menschlichen Gestalt' (1853), has proposed a system founded upon the spinal column, and the measures of which are of the skeleton. He assumes the true unit of measurement to be one-third of the length of the moveable part of the spine, thus dividing the distance between the os sacrum and the base of the skull into three parts instead of the four parts adopted by Mr. Schmidt. This unit he assumes on the ground that the vertebral column is the first-formed structure of the human frame, and the portion which changes least in its development. But whether or not the spinal column intimate the fundamental law out of which a scheme of proportion may be built, the measures of the skeleton are not practically sufficient for the artist. He needs the lengths and breadths of the human figure as it appears and is when covered with muscle. Not only is it very difficult to find the exact length of the spine which is the unit of measurement, but when found, it is difficult of application, and the divisions are for the most part fractional. Thus, he divides the unit into three parts, each part into 24 minutes, and each minute into 3 seconds. And what is the result? The whole height he makes 9 parts 12 min., the length of the thigh 2 parts 12 min., length of upper arm 1 part 15 min., of lower arm 1 part 9 min., of foot 1 part 12 min. And, after all, these measurements are only measurements of the skeleton.

D. R. Hay has among the English proposed a system entitled to the praise of being founded upon principles entirely different from those thus far considered. One work, in which these principles are developed, is entitled 'The Geometric Beauty of the Human Figure Defined; to which is prefixed a System of Æsthetic Proportion applicable to Architecture and the other Formative Arts.' And another work, subsequently published, is entitled 'The Natural Principles of Beauty, as Developed in the Human Figure.' Starting with the statement that beauty is not only an existence in the mind of the observer, but is an inherent quality of the object, he proceeds to declare that the perfect proportions of human form agree with the laws of harmony in music, and upon this theory he applies to the figure certain angles, founded, as he says, on musical intervals, and called by him tonic angles, dominant angles, mediant angles, subtonic angles, and supertonic angles. All these angles are formed upon a vertical line drawn from head to foot through the centre of the body. The intersection of the lines of these angles gives points through which on either side lines are drawn parallel to the main line, enclosing the body and touching the hips on either side. Upon these lines and angles other lines and angles and circles are drawn, the intersections of which determine the different dimensions of the body. Were there no other objection to this system, it would be found exceedingly complicated. But besides this, whether well founded in theory or not, it is not susceptible of practical application for artistic purposes. What is needed by the artist is, on the one hand, neither a system like that of Messrs. Carus and Schmidt—of which the unit of measurement is hidden out of sight, so that only the utmost care would insure exactness, and which when found is only a measure of the skeleton—nor a system like that of Mr. Hay, of complicated lines, and angles, and circles, which, though possible of application to a figure in a diagram, would, to say the least, be excessively difficult to apply to any figure in the round or in action; but some simple method, which shall not only be geometrical and scientific in itself, but perfectly intelligible and easy of practical application.

Mr. Gibson has invented a method which goes certainly far towards answering these conditions. He divides the entire height of the figure into nineteen parts (thus agreeing in his divisions with the old Egyptian canon), of which he takes two as a radius by which he draws a circle. This he encloses by a square, through which he draws two diagonals from corner to corner. One half of the figure so formed is the diagram invented by Mr. Gibson as containing the measurements of the human figure. His diagram is this.



The hypothenuse, he says, represents a measure of length that is repeated three times in the human figure. 1st, from the heel to the middle of the patella; 2nd, from the middle of the patella to the superior spinous process of the ilium; 3rd, from the bottom of the abdomen to the pit of the neck.

The line A B or A C measures five spaces in the human figure, 1st, from the instep to the bottom of the patella; 2nd, from the top of the patella to the bottom of the pubis; 3rd, from the navel to the pit of the neck; 4th, from the knuckles to the elbow; and 5th, from the elbow to the shoulder.

The line D A he subdivides into five equal spaces. The radius D E represents the length of the face from the bottom of the chin to the top of the forehead, and the length of the foot from the front of the ankle to the end of the second toe; D I, or half the radius, is the length of the neck from the fontanella to the junction of the face with the chin; D E, or the radius and one-seventh part, is the length of the head. The line A C he divides into seven equal parts, and five of these parts he states as the length of the foot.*

This system, though it does not exactly correspond to that of Vitruvius in some of its measurements, closely approximates thereto, and, as far as it goes, recommends itself for simplicity and for the ease with which it can be practically applied. Its measurements, however, are very few, and confined to the lengths of the figure; and the subdivisions of the whole figure into 19 parts, from 2 of which the radius is formed, would leave much to be desired. This subdivision, though it corresponds to the Egyptian canon of the British Museum, was improved upon, even in Egypt, at a subsequent period; and it is by no means probable that it was adopted by the Greeks, the tendency of all canons of proportion in those countries being, as has been already shown, to multiply their subdivisions, and to increase the height of the figure in proportion to its breadth.

Another curious and elaborate scheme of proportions has been offered by Dr. A. Zeising in his 'Treue Lehre von den Proportionen des menschlichen Körpers,' † a work full of information on this subject, and exhibiting much research and ability. This system, to the development of which he gives more than 160 octavo pages, cannot be done justice to in the few lines which can be here devoted to it; and the reader interested in these matters is referred to the work itself, in which he will find much to interest him in the scientific and theoretic explanations of the system, as well as in its practical application. The "morphologic ground law underlying all nature and art," which he here sets forth, is applicable, as he says, not only to the proportions of the human figure, but to architecture, music, plants, crystals, animals, poetry, ethics, and religion; and to these he elaborately applies it in the course of his work with much ingenuity.

Space will not permit us to enter upon the metaphysical discussion with which he introduces his scheme, and we can only hope to give the barest outline of the main law which forms the basis of it.

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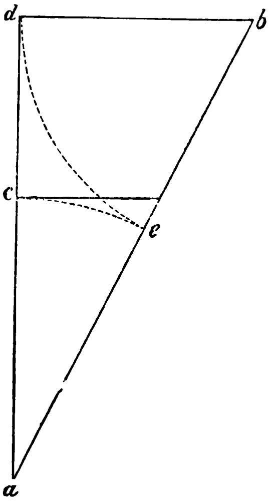
* These statements are from a corrected copy of the printed pamphlet, altered by Mr. Gibson.

† "Aus einem bisher unerkannt gebliebenden, die ganze Natur und Kunst durchdringenden morphologischen Grundgesetze, entwickelt und mit einer vollständigen historischen Uebersicht der bisherigen Systeme begleitet."—Leipzig, 1854.

His first proposition is—"If a separation of one whole into unequal parts be made proportionally, the smaller part must bear the same relation to the larger part that the larger part does to the whole; or, conversely, the whole must bear the same relation to the greater part as the greater part to the smaller."

To obtain these proportions, he makes the accompanying geometrical figure, the construction of which is thus explained. From the given line $a\,b$ (which we may here state is the total height when the system is applied to the human figure) the line $b\,d = \frac{1}{2}\,a\,b$ is set off in a right angle, and the points $d\;a$ are joined by the hypothenuse drawn from one to the other. On the hypothenuse $d\,e = b\,d$ is set off, and on the line $a\,b$ is set off $a\,c = a\,e$. $a\,c$ then is the sought for the greater part, and $b\,c$ is the sought for the lesser part of $a\,b$, which is the whole; and the lesser part $b\,c$ is to the greater part $a\,c$ as the greater part $a\,c$ is to the whole $a\,b$, the formula being simply, $b\,c : a\,c = a\,c : a\,b$.



This formula, he proceeds to declare, corresponds exactly to that of Aristoteles and Plato.* Thus, $a\,b = 12$, $b\,d = 6$, and $a\,d =$ the square root $(12^2 + 6^2)$, *i.e.*, $144 + 36 = 180$. But as there is no number which is exactly the square root of 180, he takes approximatively a fraction between 13 and 14, namely, 13.42.

$a\,b$, then $= 12.$
$b\,d$ „ $= 6.$
$a\,c$ „ $= 7.42.$
$a\,d$ „ $= 13.42.$
$b\,c$ „ $= 4.58.$

i.e., $4.58 : 7.42 = 7.42 ; 12.$

"In proving this we find, therefore," he continues, "that the first part (4.58) goes to the second part (7.42), $1\frac{142}{229}$ times, and the middle part (7.42) goes to the last part (12), $1\frac{222}{371}$ times; so that between the two relations there is the small difference of $\frac{241}{84959}$ or $\frac{1}{399}$ths.†

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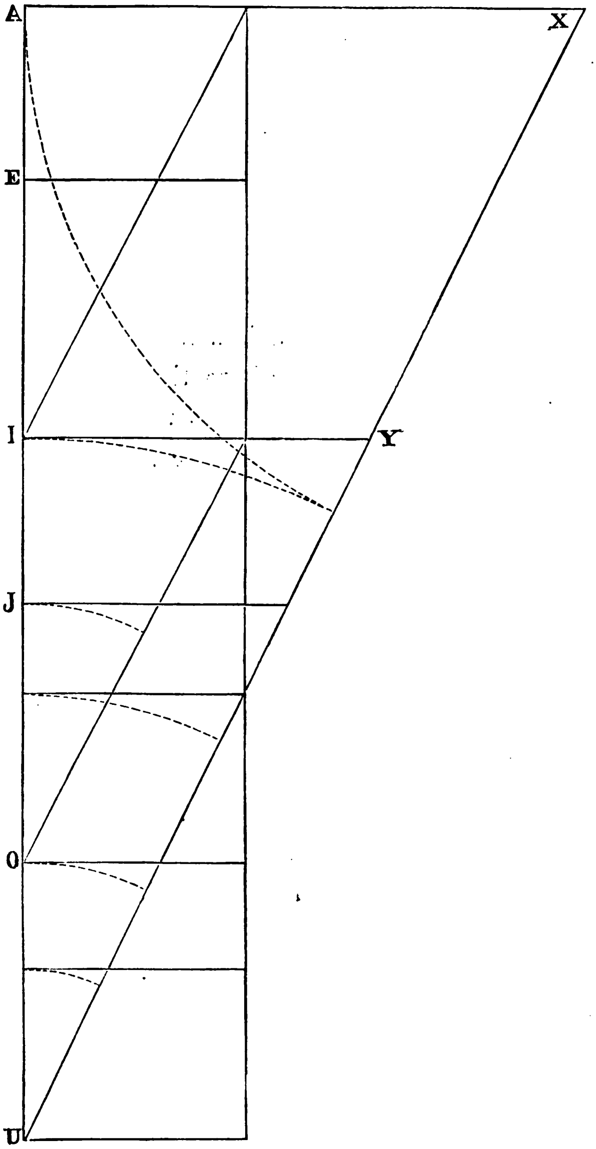
* Timaeus, 31 b.

† Ethics, v. 3. See Problem 16, 19, 35, 38, 39.

This division of a given line, called by mathematicians "the golden cut" (der goldner schnitt), is the root of all the proportions of nature, according to Dr. Zeising. In the practical application of the system to the human figure, the total height is taken as *a b*, that is, "the whole," which is divided into lesser and greater. The greater is then taken as whole and divided again into two parts, and so on until the height, *i. e.*, the line *a b*, is divided into as many parts as are wished. The diagram here annexed will show more clearly than any explanation the method proposed. In this diagram, A U, the total



height, is subdivided, according to the method before explained, into A I and I U. I U is then subdivided in the same way into I O and O U. A I is subdivided in like manner. These are the main divisions upon which as many subdivisions may be made as desired. A then is the top of the head, E determines the shoulders at the junction with the neck, I the navel, O the point below the knee, U the sole. The other divisions represent—

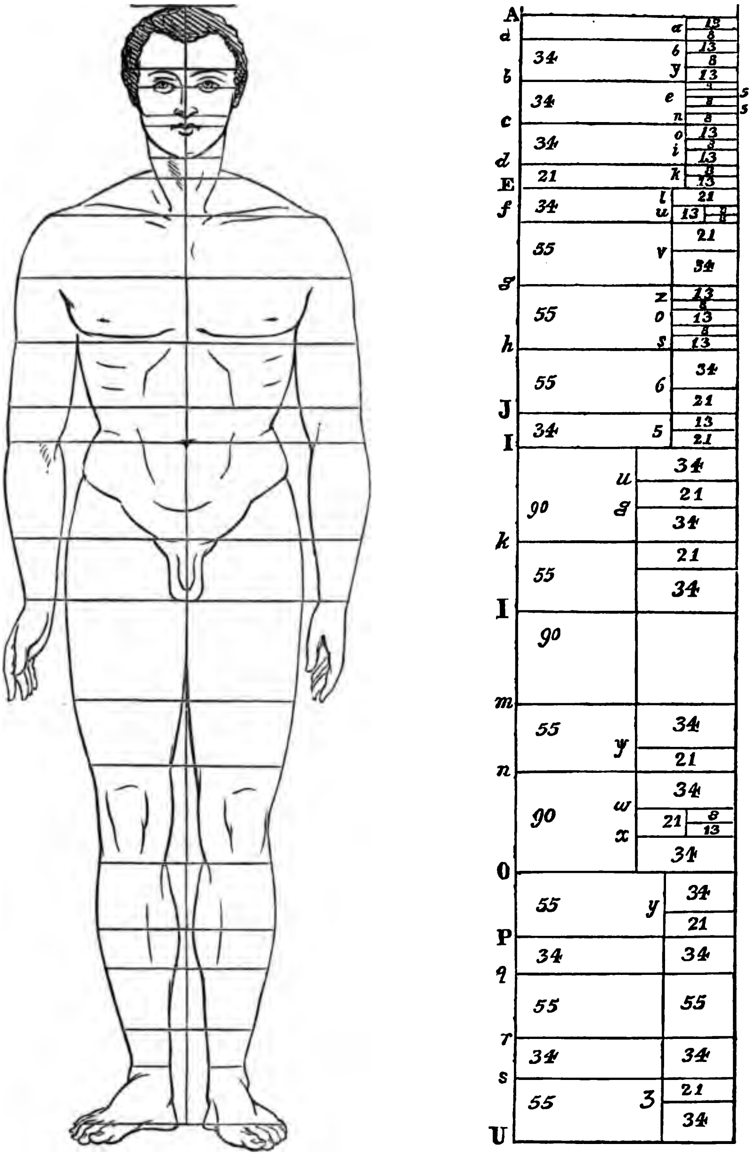
a, the roots of the hair.
b, the centre of the eyes.
c, the base of the nose.
d, the chin.
f, the top of the breast-bone.
g, the pit of the arms.
h, the base of the breasts.
j, the end of the false ribs.
k, the pubis.
m, the mid thighs.
n, the beginning of the knee.
p, the mid calf.
q, the base of the calf.
r, the thinnest portion of the ankle.
s, the inner ankle-bone.

These, again, are by Dr. Zeising subdivided into numerous other parts, as will be seen upon the diagram.

In the same way he applies this principle to the measurements of the lengths of the arms and of the feet, and to the breadths and depths of the body seen in front and in profile, and claims that under all circumstances the proportioned divisions are thus expressed.

This system is applied by the author to various statues, and is worked out scientifically, theoretically, mathematically, and metaphysically with much ingenuity.

The proof, however, that none of these systems over which so hurried a glance has been cast have been considered as satisfactory is to be found in the constant attempts to invent new ones. The system on which nearly all the writers on proportion proceeded has been by taking a member of the body as an unit (usually the head, or foot, or hand), and applying this as a measure to all the parts. This method, however, though generally used, has been found unsatisfactory both in theory and practice. In fact, the best figures vary when measured by this unit, and the authorities differ as to whether 7½ or 8 heads should be given to the full height. The measurements of Audran do not give 8 heads even to the tallest of the antique statues, though this is the measure stated by Vitruvius, and generally established in modern theory, if not in modern practice. Besides, the head is practically a very difficult measure to take. In the first place, allowance must be



made for the hair; then the measure differs according to the points from which it is taken—from the chin to the summit of the back head being longer, of course, than the measure of the perpendicular section; and, after all, the measure is never a precise one. Besides, how can there be an absolute standard in features, and lengths of face and head, which must vary according to the character and expression intended to be conveyed more than any other part of the body? The ideal absolute length may be stated, but the practical measure becomes very difficult, and is, in fact, only approximative. How can the height of the head alone be accurately taken if the head be covered with hair? and if this be the unit of measurement, how can any exactness be expected in practice? It is to this that every question must be referred, and the standard itself is practically vague. Besides, in the course of the work, the addition of an eighth of an inch to the face and head to obtain a desired expression at once puts out all the measures previously taken.

Nor is the foot a satisfactory unit, for it does not satisfactorily divide the figure. The foot is not established exactly as to its length. In some figures it is longer, in some shorter; and there is as much difference of opinion as to its proper length among the writers on proportion as there is difference of fact among the ancient statues. Ordinarily it is reckoned at about one-seventh of the height; and as the figure cannot be satisfactorily divided into sevenths, the foot is not often used as an unit of measurement.

The systems of Messrs. Hay, Gibson, Schmidt, and Zeising are founded on a different principle. Instead of seeking the unit of measurement in the figure itself, they endeavour to create a geometric formula independent of the figure, which shall have a scientific and theoretic basis as well as a practical application. Whether or not these systems are satisfactory, there is no doubt that they are on a higher level than the previous merely empirical measurements. And it is evident that no system of proportions will ever be satisfactory unless it recommend itself to science, and not only be practically easy of application, but be founded upon geometry and numbers.

CHAPTER IV.

A NEW SYSTEM OF PROPORTION.

Before proposing a new method by which it is believed that the proportions of the human figure may be established geometrically, numerically, and practically, it may be as well briefly to recapitulate a few points.

We have already seen that in the early history of science and art, the Cabala of numbers and symbols played a most important part. Among the ancient Chaldeans, Egyptians, and Hebrews, science and religion were formalized by mystical numbers and symbols, which were intelligible only to the initiated. They lay at the basis of the Egyptian mysteries. They entered into the prophecies and formal worship of the Jews; they were taught in the philosophical systems of Pythagoras, Plato, Aristoteles, Aristoxenes, Cicero, and Plotinus. The creation and operation of the universe, the laws of astronomy, the character of the elements were founded upon them. They entered into all the theories of art. In music, which is the most ideal of the arts, and the only one which has been reduced to science, they had their most perfect expression: while in the other arts, the laws of symmetry and proportion were always assumed to be absolute, not relative, and susceptible of exact geometrical and numerical statement. The theories of philosophers were accepted by artists, and Polycletus, Euphranor, and Lysippus sought to formalize them into canons. That of Polycletus attained to universal acceptance, and made his name famous for ever. That this celebrated canon should have been merely a well-proportioned figure, not made according to some absolute law or formula outside of it, and capable of application to all other figures, seems simply absurd, when it is remembered that the nobly proportioned statues of Phidias and other celebrated sculptors preceded this work of Polycletus; and in such case, any statue of Phidias was as well entitled to be called a canon as the statue of the Doryphoros. The fact must have been, that the figure by Polycletus was, as Pliny states, made after a certain law (a lege quadam), which was the real canon. It is also to be observed that this term was applied to no other statue of Polycletus.

This canon has, however, been lost, and the confused description of it by Vitruvius is all that remains to us. In this we have only a few arbitrary measures, but no system. But that there was a system founded upon geometry and numbers is manifest, from his statement that the square and circle were prominent features in it, and that the measures were distributed according to the perfect number of Plato.*

Now this perfect number of Plato, as we have seen, was not 10, as stated by Vitruvius, but 12, which is the multiple of 4 and 3, each of which had a mystical meaning.

The circle is the figure which, according to Plato, is the type of the universe, and was, according to him and Pythagoras, created out of the dodecahedron or 12-sided figure (Timæus xxix.), and symbolically represents the perfect number.*

The square represented solidity, establishment, law, and was the symbol of the number 4.

To this must be added the symbol of the number 3, which, as we have seen, is the triangle, pyramid, or tetraedron representing the divine nature or the element of fire (or the soul) filched from heaven by Prometheus.

With these three geometrical symbols, the circle, square, and triangle, and the three numbers representing them, 12, 4, 3, we have not only a mystical statement of man, but the symbol and canon of all his proportions.

A square and a triangle inscribed in a circle, and intersected by the diameter, is then the diagram now proposed as a canon of proportion, which will satisfy all the scientific and practical conditions demanded for such a canon.*

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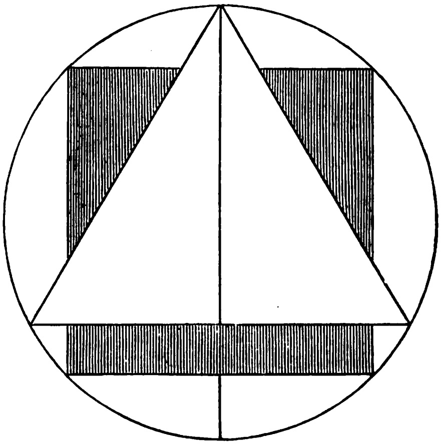
* "Omnes insuper lineæ circuli à centro exeuntes in circumferentiam, et ab ea in centrum, denotant, quod omnes creaturæ emanantes a centro supremæ spheræ tanquam in finem earum."—Pico 'Cabalist. Dogmata.' p. 13. See also p. 37.



First—Mystically considered, this is the symbol of man. The circle is the world; the triangle is the Trinity or divine nature enclosed within the world, or Christ, the ideal man, the God in nature; and the square is his manifestation and establishment according to law in the world.

The measures of Christ are the measures of the perfect man.

Observe how perfectly, also, the Revelations of St. John agree with these cabalistic numbers and symbols of the ancients, as expressed in this canon. In his description of the New Jerusalem, in which the perfect condition of man is symbolized, he says: "The city lieth four square, and the length is as large as the breadth; and he measured the city with a reed, twelve thousand furlongs." "On the east three gates; on the north three gates; on the south three gates; and on the west three gates."

"And he measured the wall thereof, an hundred and forty-four cubits, *according to the measure of a man,* that is, of the angel."

Here we have the four-square and the three gates to each side, making twelve, and the measure of a man equal to 144 cubits, which is the square of 12, the επιτριτος πυθμην of Plato, the teleion or perfect number.

Second—It is purely geometrical and independent of the figure

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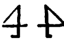
* The triangle, subdivided by the diameter, makes, it will be observed, two figures 4, reversed upon each other (), while the side of the triangle is one-fourth of the entire height.

itself, to which it is to be applied. The unit of proportion is not taken from any part of the body, but is contained absolutely in the diagram, so that any part may be increased for a special effect without disturbing the other proportions.

Third—It is eminently practical, and simple of application: a mistake is impossible in the measurements of the straight lines of this diagram. When the unit is in the figure itself, and must be taken from the round, which often cannot be measured at all, and seldom with exactness, but also multiplied to obtain the principal measures, great care must be observed to attain to anything like exactness. Thus, if this unit be the cubit or distance from the elbow to the end of the fingers, it is plain that this would be rarely possible to take, while if the head be the unit as it is covered with hair, it can never be susceptible of any exactness of measurement. It must also be admitted that the proportional size of the head differs so greatly in different persons, and depends so much upon the subject of any work of art, that for this reason alone, if for no other, it is quite unsatisfactory as a unit of proportion. Again, if the face be taken, not only the same objection obtains, but the face being one-tenth of the figure, does not give any proper standard of measurement, the figure not being divisible into tenths, except to a very limited extent. Besides, the unit is too small for the chief measurements.

Fourth—The measurements of the body by this system are, as will be seen, to divisions plainly visible on the surface, and distinctly marked by the muscles or bones, and not to interior and hidden parts of the structure, such as that of Professor Carus, which is founded on the spine, or of Professor Schmidt, founded on the skeleton. It is not necessary, therefore, to be intimately acquainted with the interior anatomy of the body in order to apply them, as they have only to do with that which is superficial or plainly visible on the surface. Nay, it even enables the artist to know exactly where the chief points of the figure are, and where to place them; and thus supplies, to a certain extent, any want of knowledge on his part. No system of proportion, however ingenious or theoretically exact, is adapted to the wants of the artist unless it be founded upon clear and distinct markings of the surface.

It now remains to explain the practical method of application, and then to give a table of all the measures.

And first as to the practical method of application. This is perfectly simple and easy. The entire height of the figure is 3½ diameters, or 7 half-diameters; 4 times the base of the triangle, or 5 times the side of the square. The moment the artist has determined the height of the figure he intends to make, he takes a quarter of it as the length of the side of an equilateral triangle: then dividing the base into two equal parts by a line drawn from its apex, and extending it below the base a distance equal to one-third of the length above it, he has the diameter of the circle from which he draws the circumference. In this he inscribes the square, which is at once found by drawing two diameters at right angles, and uniting their extremities at the points where they touch the circumference. This diagram contains the principal measures, and nothing remains but to subdivide the diameter and the sides of the triangle and square into thirds and fourths, in order to obtain all the smaller measures.

Or, having established the height of his figure, he takes one-fifth as the side of the square, and drawing a diagonal from corner to corner, he has the diameter of the circle, in which he inscribes the equilateral triangle.

Or, taking one-seventh of the height of the figure as a radius, he draws the circle and inscribes the square and equilateral triangle in it.

Or, suppose the artist to have determined in his mind the length or breadth or depth of any part of his figure—say the head (intending the figure to be 8 heads high)—he has only to double this length to obtain the base of the triangle; or if the figure is to be 7 heads high, he takes double the length for the diameter; or if he have established the length of the foot he does the same; or if it be 7½ heads high he takes this as equal to two-thirds the side of the square; or if he know the breadth of the shoulders he has the diameter; or the depth of chest, he has three-quarters the square, and so on. In a word, knowing any part, he may reconstruct the figure exactly: and with this canon the modern descendants of Telekles and Theodorus might again model two halves of a statue, the one at Ephesus and the other at Samos, which, on being brought together, would be found to correspond in all their dimensions.

This diagram gives not only all the lengths of the body, but also the breadths of the body as viewed in front, and the depths as viewed in profile. If, however, it be desired to make a figure broader or slenderer in proportion to its height than the medium, the artist has only to draw two diagrams, one slightly larger than the other, and to adopt one of them as the measure of the lengths, and the other of the breadths and depths. If the smaller diagram be taken for the breadths and depths, the figure will be slenderer than the medium. If the larger diagram be taken for this purpose, the figure will be stouter.

Let us now proceed to explain the measures of proportion contained in the diagram.

I. The longest line is the diameter, and this measures the chief lengths and the greatest breadth.

1. From sole to middle of patella.
2. Thence to crest of ilium.
3. „ angle of neck and shoulder.
4. From pit of neck or fontanella to lower abdomen.
5. Eyebrows to waist.
6. Top of head to base of sternum.
7. Mouth to navel.
8. Pubis to centre of chest.
9. Utmost breadth of shoulders.
10. Top of scapula to angle of buttocks near the os coccygis.
11. Thence to below knee.
12. Cleft under the arm or scapula to base of buttocks.
13. Hip to patella, where the leg is bent at a right angle.

II. The next longest line in the diagram is the side of the triangle. This divides the figure into four equal parts.

1. Top of front head to nipples.
2. Thence to pubis.
3. „ base of patella.
4. „ sole of foot.

or these nine equal parts :—

1. Inner malleolus to middle of patella.
2. Thence to bottom of abdomen.
3. „ depression of sternum on a line with the armpits.
4. Elbow to tips of fingers.
5. Middle of patella to hip-joint.
6. Base of nose to waist.
7. Centre of throat to navel
8. Middle of sternum to spine of ilium.
9. Pubis to bottom of knee.
10. Opposite mid-knee to angle of buttocks at os coccygis.

III. The next longest line is the diameter to its truncation, by the base of the triangle or three-fourths of the diameter. This measures—

1. External malleolus to below the knee.
2. Thence to the base of the glutei or buttocks.
3. Middle of patella to bottom of pubis.
4. Top of patella to hip-joint or lower abdomen.
5. Pit of neck to navel.
6. Crest of ilium to armpits.
7. Armpits to roots of hair.
8. Roots of hair to sternum on level of nipples.
9. Base of sternum to hip.
10. Level of nipples to lower abdomen.
11. Scapula to angle of buttocks at os coccygis.
12. Across heads of humerus.
13. Fontanella to inner bend of arm.
14. Thence to knuckles.
15. Breadth of pelvis in woman.
16. Base of knee to base of buttocks.
17. „ sternum to hip joint.
18. Thence to above knee.

Three-fourths of the diameter also gives the measurement of the bent arm from the elbow to the shoulder and to the knuckles, the length of these two parts being greater when the arm is bent to a right angle than when it hangs straight. In the latter case the measure, as we shall see, is half the square.

IV. The next longest line is the side of the square. This measures—

The arm :—

1. From humerus to elbow.
2. „ elbow to knuckles.

And

1. Navel to armpits.
2. Thence to between the brows.
3. Pit of sternum to bottom of abdomen.
4. „ „ to inner corner of eye.
5. Nipples to top of ear.
6. Utmost width across pectorals in man.
7. „ „ „ upper pelvis in woman.

V. The smaller measures of length, breadth, and depth are found by subdividing the diameter, triangle, and square.

And first as to the measures of *length.* Those obtained from three-fourths of the diameter have been already given.

$\frac{1}{2}$ D to T, that is, half the diameter to its truncation, by the base of the triangle, gives the length of the hand from the wrist-bone to the tip of the forefinger.

$\frac{1}{2}$ DIAMETER divides the total height into seven equal parts.

1. From front head to junction of shoulders with neck.
2. Thence to top of ribs.
3. „ crest of ilium.
4. „ midway thigh.
5. „ middle of patella.
6. „ midway leg—base of calf.
7. „ sole.

It also measures—

1. The length of the female foot.
2. Upper angle of pectorals to inner bend of arm.

3. Elbow to wrist-bone.
4. Elbow to upper division of arm from back.
5. Sternum at level of nipples to navel.
6. Chin to pit of sternum.

It also makes two inverted equilateral triangles, the base of each being the distance between the nipples, viz.—

1. From chin to nipples diagonally.
2. „ nipples to depression above navel.

¼ diameter measures—

1. Brow to chin.
2. Middle of throat to depression of sternum.
3. Roots of hair to line of upper lip.
4. Top of chin to fontanella.

We now come to the divisions of the *Triangle*, which give the following measures of *length*.

¾ base of triangle measures—

1. Top of cranium to fontanella.
2. Thence to level of waist.
3. Corner of eye to sternum on level of nipples.
4. Top of ribs to lower abdomen.

⅔ triangle measures

Two equilateral triangles—the base of each being the waist in man—and the other sides being—

1. Pubis to waist diagonally.
2. Thence to depression of sternum on level of armpits

Also—

3. Inner bend of arm to base of palm.

½ base of triangle divides the figure into 8 equal parts; and is therefore the measure of the whole head when taken as ⅛th of the whole height; or of the head from a point perpendicular to the outer corner of the eye to the chin, when the figure is 7½ heads high.

1. Top of front head to chin.
2. Thence to level of nipples.
3. „ depression above navel.
4. „ pubis.
5. „ midway thigh (at angle of biceps and semitendonous).
6. „ below patella.
7. „ midway lower leg.
8. „ sole.

Or,

1. Between brows to fontanella.
2. Centre of throat to pit of sternum, and diagonally to nipples.
3. Thence to navel.
4. Depression above navel to genitals.
5. Middle of patella to angle of calf as seen in front.
6. Thence to outer malleolus or top of instep.

⅓ the triangle is also the measure from the foramen of the ear to the brow and chin, when measured on the round; measured on the plane they are ¼ D, and to the top of the head ⅓ T.

¼ of triangle is the measure diagonally from chin to fontanella.

We now come to the divisions of the *Square*, and these give the following measures of length:—

¾ Square is—

1. The length of the foot in man.
2. Elbow, to base of palm below wrist-bone.
3. From nipples to navel diagonally.

⅔ Square is the measure of the head when the figure is 7½ heads high; and this divided into four equal parts, gives—

1. To the roots of the hair.
2. „ eyelid.
3. „ base of the nose.
4. „ chin.

½ Square measures—
1. The hand.
2. Roots of hair to chin.
3. Base of nose to top of head.
4. From nipples to fontanella, diagonally.

¼ Square is the length of the neck.

⅙ Square is the length of the ear.

We now come to the *Breadths* of the figure in *front,* and the *Depths* in profile.

And first as to the measures in man—those in woman being entirely different.

Diameter.

Front Breadths in Man.

THE DIAMETER measures the utmost breadth of the shoulders.

¾ the diameter measures from humerus to humerus.

½ diameter from nipple to nipple as well as from the chin to nipples; and from nipples to depression above navel; thus forming two inverted equilateral triangles, the base of which is the distance between the nipples.

⅔ diameter measures the breadth across the hips.

½ D T from angle at spine of ilium to opposite angle.

⅓ diameter measures the breadth of each thigh.

¼ ,, the breadth of calf if large; the ordinary measure is ⅓ square.

¼ diagonal from navel to spine of ilium.

,, thence to centre of base of abdomen.

⅙ ordinary measure across malleoli and bones.

Profile Depths.

½ diameter measures, depth of chest under pectorals.

½ diameter to its truncation, by the triangle, or D T measures—
1. The waist.
2. Thigh below buttocks.

¼ diameter measures, depth of knee.

¼ ,, depth of calf.

THE SIDE OF THE TRIANGLE measures as follows :—

Front Breadths.
Triangle.

$\frac{3}{4}$ = Breadth of hips.

$\frac{3}{4}$ = Chest under ribs.

$\frac{2}{3}$ T = Waist. The same distance is to the centre of sternum on level of armpits, and to pubis, diagonally making two inverted equilateral triangles. This is the measure of the antique statues, but three-fourths the square gives more elegance to the torso.

$\frac{1}{3}$ T = Across foramen of ears; width of temples; leg, one-third way from pubis to knee.

$\frac{1}{4}$ T =
1. Greatest width of front arm.
2. Across the knee at mid patella.
3. Leg at base of calf.
4. Foot.

$\frac{1}{6}$ T = Narrowest part above ankle.

Profile depths.
Triangle.

$\frac{1}{2}$ T = Depth of head in profile.

$\frac{1}{3}$ T = Foramen of ear to brow, chin, and back head when measured on the round, and $\frac{1}{2}$ D when measured on the plane.

$\frac{1}{4}$ T =
1. Widest part of lower arm.
2. Upper arm $\frac{2}{3}$ way from shoulder.
3. Across below knee.

$\frac{1}{6}$ T = Wrist.

THE SQUARE measures as follows :—

Square. Across the pectorals at level of armpits; thence diagonally to between brows, or diagonally to navel; making two equilateral triangles.

Front Breadths.	$\frac{3}{4}$ Square =	Waist.
	$\frac{1}{2}$ Square =	From fontanella diagonally to nipples.
	$\frac{1}{3}$ Square =	1. Width of neck.
		2. „ above knee.
		3. „ of calf (in a slender figure).
	$\frac{1}{4}$ Square, upper arm across biceps.	
Profile Depths.	$\frac{3}{4}$ Square =	1. Depth of chest at nipples.
		2. Foot length in man.
	$\frac{1}{2}$ Square =	Across mid thigh.
	$\frac{1}{3}$ Square =	1. Upper arm under deltoid.
		2. Leg below calf.
	$\frac{1}{4}$ Square =	Ankle, narrowest part.

The head is also measured by the square when the figure is $7\frac{1}{2}$ heads high. From the top of the head to the chin is $\frac{2}{3}$ the square, and this is divided into 4 equal parts each $\frac{1}{6}$ the square, and measuring—

1. Top of cranium to the roots of the hair.
2. Thence to the eyelid.
3. „ base of nose.
4. „ chin.

When the figure is 8 heads high the head is half the triangle.

This system can be equally as well applied to the female as to the male figure. In male and female the proportions of length are the same; but those of breadth and thickness are entirely different. In man the shoulders dominate, for they express strength of action. In woman the pelvis predominates, expressing passive endurance. The great function of man is to do, and of woman to bear. The general form of man is of an inverted pyramid, the shoulders being the broadest part; that of woman is rhomboidal, the pelvis being the broadest part.

Taking, therefore, the same diagram, we have all the female proportions. The lengths being the same, it is unnecessary here to repeat all of them. The breadths of the figure seen in front, are as follows :—

FEMALE FIGURE.

Front Breadths.	Across the neck	$\frac{1}{4}$ Triangle.
	,, acromeon process	$\frac{1}{2}$ Diameter.
	Shoulders	Side of triangle.
	Pectoral, utmost width	$\frac{2}{3}$ Square.
	Upper part of bosom	$\frac{3}{4}$ Square.
	Nipples	$\frac{1}{2}$ Triangle.
	Ribs	$\frac{2}{3}$ Triangle.
	Waist	$\frac{1}{2}$ Diameter.
	Pelvis, across ilium process	$\frac{3}{4}$ Triangle.
	,, hips	Square.
	,, pubis	$\frac{3}{4}$ Diameter.
	Thigh, widest part	$\frac{1}{2}$ Diameter to triangle.
Front Breadths.	Midway leg	$\frac{1}{2}$ Square.
	Above knee	$\frac{1}{3}$ Square.
	Knee	$\frac{1}{3}$ Square or $\frac{1}{4}$ Triangle (slender).
	Calf	$\frac{1}{4}$ Diameter or $\frac{1}{3}$ Square (slender).
	Below calf	$\frac{1}{4}$ Triangle.
	Above ankle (narrowest part)	$\frac{1}{8}$ Diameter.
	Malleoli	$\frac{1}{6}$ Triangle.
	Foot	$\frac{1}{4}$ D to T.

The depths of the body seen in profile are as follows :—

Neck	$\frac{1}{4}$ Triangle.
Through bosoms	$\frac{1}{2}$ Diameter
Under bosoms	$\frac{2}{3}$ Square.
Waist	$\frac{1}{2}$ Square to hollow of spine. $\frac{1}{2}$ Diameter to triangle.
Belly opposite ilium	$\frac{1}{2}$ Diameter.
Pubis to buttocks	$\frac{1}{2}$ Diameter.
Below buttocks (utmost breadth)	$\frac{1}{2}$ Diameter to base of triangle.
Midway thigh	$\frac{1}{2}$ Square.
Above knee	$\frac{1}{4}$ Diameter.

Mid knee	¼ Diameter.
Below knee	⅓ Square.
Calf	¼ Diameter.
Ankle (narrowest part)	⅙ Triangle.
Height of instep	⅙ Triangle.
Length of foot	¾ Square.

The breadths and depths of the arm are as follows:—

Across deltoid	¼ Diameter.
Upper arm, utmost breadth	¼ Triangle.
„ depth	¼ Square.
Lower arm, utmost breadth	⅕ Diameter.
„ depth	⅕ Diameter.
Wrist, utmost breadth	⅛ Diameter.
„ depth	⅛ Diameter.
Hand, with thumb	¼ Square.

There are also certain equal spaces of measurement which are to be observed; thus—

¾ T.
1. From eye to nipples.
2. „ foramen of ear to angle of scapula.
3. „ nipples to ilium process.

½ D.
1. Ilium process to below glutei diagonally.
2. Thence to opposite top of knee, behind.
3. „ mid calf.
4. „ front of instep at angle of foot and leg.

Also ½ Diameter measures the following equal spaces:—

1. Across the clavicles—front.
2. „ waist—front.
3. Profile through bosom.

Also ¾ Diameter measures—

1. From eye to below bosoms.
2. Thence to pubis.
3. „ middle of knee.
4. Bottom of knee to malleoli.
5. Navel to fontanella.

The Triangle base divides the figure into 4 equal parts:—

1. Top of head to level of nipples.
2. Thence to pubis.
3. „ below knee.
4. „ heel.

Or these 6 equal parts:—

1. Top of bosom to bottom of abdomen.
2. Thence to mid knee.
3. „ exterior malleolus.
4. From junction of neck and shoulder to navel.
5. From level of nipples to pubis.
6. Mid forehead to bottom of bosoms.

Also—

¾ D.	Pit of neck to navel.
	Ilium spine to outer angle of bosom at armpits.
	Exterior malleolus to bottom of knee.
	Pubis to top of knee.
	Across hips.
	Nose between eyes to nipples, either way.

The arm is also measured by the Square, thus:—

Square.	Top of shoulder to elbow.
	Thence to knuckles.

Behind.	Division of arm to elbow	¾ Square.
	Elbow to wrist-bone	¾ Square.
	Elbow to base of hand	⅔ Triangle.
	Length of hand to tip of middle finger	½ Triangle.
	Length of hand to tip of little finger	½ Square.
	Elbow to tip of little finger . . .	Triangle.
Before.	Acromion to inner base of arm . .	¾ Triangle.
	Arm-pits to base of biceps	½ Square.
	Thence to knuckles	Square.
	Armpits to inner bend of arm . . .	½ Triangle.
	Thence to knuckles	¾ Triangle.
	Acromion to elbow, when the arm is bent	¾ Diameter.

These proportions will be clearly manifest in the diagram, in which it will be seen that each measure proves the other, the diameter, side of triangle and square each consenting to the points established by the others. Where, therefore, the attitude renders it difficult to take a measure as given by one, it may be taken as given by the other.

To show how perfectly these proportions coincide with the measures given by Vitruvius, and with those of the best ancient statues, a series of tables is appended, to which the reader is referred.

In taking the total height of the figure by the diameter and triangle, it will be found to be exactly the same, that is, four times the base of the triangle. This is the height to the top of the front head to a point perpendicular to the outer corner of the brow over the temple. But, making the total height five times the side of the square, there is a fraction more, corresponding to the excess of the actual height of the figure above the height of the Egyptian canon, as seen in their diagrams and drawings. This gives the true measure to the top of the skull at its highest point above the ear, and solves a difficulty which has not yet been explained in relation to the antique figures. For although Vitruvius tells us that the figure, according to the canon of Polycletus, was 8 heads high, yet the actual statues all fall short of that in measurement. Thus, in Claude Audran's measurements, the Apollo Belvidere is only 7 heads $3\frac{1}{2}$ parts; and even the Farnese Hercules, one of the smallest-headed of all the ancient statues, is only 7 heads $3\frac{7}{12}$ parts; while the Antinous and the Greek Peace, which are types of grace and elegance, are only 7 heads and 2 parts, or $7\frac{1}{2}$ heads. The fact is, that the theoretic canon made the head exactly $\frac{1}{8}$th of the total height; but then this measure was properly only to the top of the head above the temples, while the real head at its extreme point exceeded this among the ancients by a fractional excess represented by something in their scientific canon probably, and certainly expressed in their actual work. This fraction is expressed clearly by the present canon in the difference between 4 times the triangle or 7 times the radius (which are equal), and 5 times the square. Adding this fraction we have the figure at just $7\frac{1}{2}$ heads, while half the diameter gives a head of $\frac{1}{7}$th the figure, and half the triangle a head of $\frac{1}{8}$th. When the figure is $7\frac{1}{2}$ heads high, the head is $\frac{2}{3}$ the square.

On examining the relation of the figure to the circumference of the circle, it will be found that the total height up to the base of the skull, or, rather, to the bottom of the upper jaw or front teeth, is just $3\frac{1}{7}$ diameters, or, to express it exactly, is 3.1415926, or the circumference of the circle.

It is plain that the skull, which contains the brain and is the receptacle of the reasoning faculties, allying man to the divine nature, cannot in a mystic sense be properly circumscribed by the circle, which represents the world. Therefore the skull, containing the brain, which reaches beyond the world, is either measured by the triangle (representing the divine), or the square (representing law, science, establishment). The head, of $\frac{1}{8}$th the height, is just the triangle; of $7\frac{1}{2}$ is $\frac{2}{3}$ the square. But from the base of the upper jaw or the mouth to the top of the front head the height is half the square. From the base of the skull under the ear to the top of the cranium over the ear is also half the square.

For all practical purposes the side of the square may be taken as $\frac{7}{10}$ths the diameter, though, in fact, it is a slight fraction more. Calling the side of the square $\frac{70}{100}$ of the diameter, and the diameter $3\frac{1}{7}$ of the circumference, the relation of the square to the circumference is as $\frac{70}{100}$ is to $\frac{22}{7}$, or as $\frac{490}{700}$ to $\frac{2200}{700} = 4\frac{240}{490}$, or within a slight fraction of $4\frac{1}{2}$. Now $4\frac{1}{2}$ times the square equals the height of the figure to the base of the brain, and 5 times the square is the total height to the top of the cranium.

Again, dividing the figure into 1,000 parts we have $3\frac{1}{2}$ diameters, equal to 1,000, or the whole height; so that the diameter is represented by 286, within a very small fraction. Taking the circumference at $3\frac{14}{100}$ times the diameter, it is represented by $898\frac{90}{100}$. Now 3 diameters, which measure the height of the figure from the sole to the angle where the neck joins the shoulders, are equal to 858. To this add $\frac{14}{100}$ of the diameter $= 40\frac{6}{7}$, we have the height to the base of the brain, or the line between the teeth, which is $898\frac{90}{100}$, or the circumference. That is to say, the circumference, or 3.1415926 times the diameter, is the figure to the base of the brain.

The Tables in the Appendix, which have been chiefly drawn from those to be found in the interesting work of Dr. Zeising, will enable the reader to compare at a glance the proportions of the system now proposed with the proportions laid down by the chief writers on this subject, as well as with those of some of the most celebrated of the antique statues. It will be found that the differences are very small for the most part, and that the measures obtained by the proposed system almost invariably give the mean of the proportions, while they establish a more clear and absolute relation between them. It will also be observed that the measures of the antique statues differ according to the measurer, so that too much reliance must not be placed on their absolute correctness. The total height of the figure is taken in these tables as 1,000, and the fractional differences are therefore exceedingly small. In the reduction of the various measures and proportions (some of which are only into so many heads or noses) to thousandths, according to the method of Dr. Zeising, some inexactness may easily have occurred in the representation of small fractions. However, these variations and differences are generally so slight as not to be worth considering.

The measures given by Dr. Zeising in his Tables are naturally taken so as to correspond to his own system of measurement; and as this system, for the most part, differs from all others in the points of measurement, some of his measurements are only approximative when applied to the system now proposed. Thus, in giving the height, his measures are to the breast-bone or clavicle, instead of the fontanella, which occasions a slight difference between his measures and mine. So, also, he measures to the "magengrube," the "kehlkopf," which are not very precise points;—but the measures are reduced as accurately as possible.

The Egyptian Antinous, to which reference is made in these Tables, is a colossal figure executed in the time of Hadrian and now existing in the Vatican. It is Egyptian in its character and attitude, stands perfectly erect on both feet, with both hands hanging straight down to its sides, and is by many supposed to be modelled on some established canon. Whether this be so or not, its proportions generally conform to the best Greek period, and it is constantly consulted by artists as a standard of proportion. It will be found to coincide almost exactly with those of the diagram now proposed. It is a curious fact, which seems strongly to bear out the notion that it was intended as a standard of proportion and modelled upon some exact scale of measurement, that the Egyptian head-dress which it wears contains a scale by which it may be measured. This has twelve bars on the side bands which come down over the breast, and six bars in front. The measure from the top to the end of the band on the breast is the triangle;

across, from corner to corner, is $\frac{3}{4}$ the triangle. From point to point where the cap divides it is $\frac{1}{2}$ the triangle; and from this point to the sharp angle where it bends to come over the shoulders $\frac{1}{2}$ the triangle. From the line of the cap across the brow to the chin, and back to the cap bend behind the ear, is $\frac{1}{3}$ the triangle. From the base of the ear to the end of the band is $\frac{1}{2}$ the diameter. From the top of the cap to the chin is $\frac{1}{2}$ the diameter. The cap across the brow is $\frac{1}{3}$ the diameter. The distance between the two perpendicular bands is $\frac{1}{4}$ the diameter; and as it falls across the chest it gives just $\frac{1}{4}$ the width of the shoulders. From the lower corner of the band to the top of the band across the head over the ear is just 1 square; to the chin is $\frac{1}{2}$ the square. From the bottom of the ear to the bend of the band $\frac{1}{4}$ the square.

If these measures are merely accidental, their coincidence with a scale by which the whole figure in all its proportions may accurately be measured is very striking. But a similar fact is observable in another statue, representing a young man with a fillet bound across his brow, the ends of which, held up in either hand on a level with the head, he allows to fall upon his breast. This is supposed to be a copy of the famous statue of Polycletus, called the Diadumenos,* and is the only one now known to exist. It was found in excavating the Baths of Caracalla, and for many years formed a part of the Farnese Collection at Rome. It has, however, been lately purchased for the British Museum at London. The original statue, on account of its beautiful proportions, obtained a fame scarcely inferior to that of the Doryphorus, and was an embodiment of the same system. This copy is, therefore, peculiarly interesting as indicating what were the proportions adopted by him in his canon. An engraving from it is given in the 'Monumens de l'Art Antique,' by Ch. O. Müller and Chas. Oesterley, from which the accompanying figure is traced. Like the head-dress of the Egyptian Antinous, the fillet clearly gives the scale of proportions adopted by the artist. The distance between the two sides where they meet the shoulders gives exactly their true breadth, and corresponds to the diameter of the circle, by which the principal lengths are measured while the length of the side of the triangle is precisely the distance between the two sides of the fillet to the point where it is held up by the hands; and its length below the little finger to the bead at its end is just half the triangle. The length of the side of the square is given by the measure from the base of the chin to the bead of the fillet.

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* Thus described by Lucian: "Nor do I speak of that statue with the head bound about by the fillet, the beautiful one, for that is the work of Polycletus."—Philopseude, 18. See also Pliny's description of the statue.

We have therefore the diameter, triangle, and square perfectly represented in this fillet; and, as they exactly measure all the proportions of the figure, there can be little doubt that they are the scale by which the proportions are distributed. Beneath the engraving here given is placed the proposed diagram, and, on application of it even to this small figure, it will be found to measure with remarkable accuracy all its proportions of length and breadth.

The Greek Peace—so called—is a statue of the best period of the Greeks, the measures of which are given by Claude Audran. It represents a soldier of the guard of the King of Persia, and has, perhaps, held a javelin in one hand and a shield in the other: both of these are now wanting. It is particularly interesting in this respect, that it has been supposed by some persons to be a copy of the Doryphoros of Polycletus, embodying the proportions of his canon. I only know the statue by report. Its height is 5 feet 6½ inches, or 7 heads 2 parts, according to Audran.

The gladiatore Borghese, which bears on its trunk the name of Agasias, is later than the Alexandrine period, and after the school of Lysippus, who, it will be remembered, endeavoured to improve on the standard of Polycletus by rendering his figure slenderer and longer in their proportions. The proportions of this statue, given in the Tables, are taken from Herr Godefroy Schadow's work, entitled 'Polyklet.' From the same work, also, have been taken the proportions of the Venus of Milo, the Theseus, and some of the measures of the Venus de' Medicis. These measures were originally given by Herr Schadow in feet and inches, 12 inches composing the foot, and the total figure being 70 inches. In the reduction of these to thousandths I have endeavoured to attain to all possible accuracy; but there is a little confusion in some of his measures, and sometimes two measures are given for the same part.

TABLES.

Nos. 1 & 2.—Comparison of Proposed System with other Systems, Ancient and Modern. Measurements of Height.

No. 3.—Comparison of Proposed System, with Measurements from Antique Statues. Measurements of Height.

No. 4.—Comparison of Proposed System with other Systems, Ancient and Modern. Measurements of Breadth.

Nos. 5 & 6.—Comparison of Proposed System with Antique Statues. Measurements of Breadth.

No. 7.—Comparison of Proposed System with Ancient Statues. Measurements of Depth.

No. 1.—COMPARISON of PROPOSED SYSTEM with other SYSTEMS, ANCIENT and MODERN.

MEASUREMENTS OF HEIGHT.		Zeising.		Vitruvius.	Varro.	Alberti.	Dürer.	Michael Angelo.	Cousin.	Lavater.	Schadow.	Montabert.	Salvage.	Quetelet.	Schmidt.	Perger.	Sctler.	Hay.	Elster.	Carus.	Greatest Difference.		Proposed Canon.	
Head.	Top of head to centre of chin	124·6		125	.	.	125	122^5	125	125	.	.	125	.	..	125	125	125	125	.	122	125	½ T	125
	Top of head to below chin	132·7		.	.	136·8	.	.	.	.	136	132	...	135	132	.	.	.	..	.	132	136	⅔ S	133⅓
	Top of head, angle of shoulders	145·8		.	142·9	153	.	.	.	.	.	.	..	.	..	.	.	.	..	.	142	153	½ D	150
	Hair to mid-chin	103·3		100	.	.	100	105	93·7	100	..	100	100	.	..	100	100	.	100	108	93·7	108	⅓ D	95⅓
Neck.	Mid-chin to clavicle	47·4		.	.	.	.	.	31·2	50	52	.	..	.	..	.	.	.	..	.	31	52	⅓ S	66⅓
	Mid-chin to breast-bone	55·7		.	42	.	.	70	.	.	.	50	..	.	..	.	.	65	42	52·6	42	70		
Body.	Clavicle to navel	209·8 223·		.	222	.	210	.	218	233	.	225	..	225	..	.	.	.	..	210	209	233	¾ D	214·5
	Breast-bone to navel	201·4 214·5		.	.	.	.	210	.	.	.	.	..	.	..	.	.	212	187 218	.	187	218		
	Clavicle to mons veneris	299·8		.	.	.	296	.	.	.	.	.	..	.	..	.	.	.	300	.	296	300	1½ S	300
	Clavicle to pubis	321		.	.	.	.	.	321	333	.	.	..	321	..	.	.	.	..	.	321	333	1⅛ D	321¾
	Navel to pubis	111		.	111	116	.	105	125	100	.	.	125	94	96	100	.	98	..	105	94	125	1 1/16 S	115
Navel to Knee.	Navel to top of knee	300·	313·1	.	.	.	.	.	.	.	.	.	300	.	..	.	.	.	300	.	300	313	1½ S	300
	Navel to mid-knee	313·1	326·2	.	.	.	.	.	.	.	.	310	..	318	324	.	.	.	..	.	310	326	1⅓ T	333⅓
	Navel to knee-bend	321·2	334·3	.	333	.	.	.	.	.	.	.	..	.	..	.	.	.	..	.	321	334		
	Navel to base of knee	368·8	381·8	.	.	365	.	.	375	.	.	.	..	.	..	.	.	.	..	.	365	381	D + ⅓ T	369⅓
	Head of thigh-bone to knee-bend	262		.	.	.	.	.	.	.	.	.	275	.	..	.	.	.	..	263	262	275	⅞ D D	252 {Centre of patella. Mean 270. 286 {Base of patella.
Leg.	Top of knee to sole	304·8		.	.	.	.	.	.	.	.	.	300	.	..	300	.	.	300	.	300	304	D + ⅛ T	317¼
	Mid-knee to sole	291·7		.	.	.	.	.	.	.	.	.	..	.	288	.	.	.	..	.	288	291	D	286
	Knee-bend to sole	283·5		.	296	282	.	.	.	266	.	280	..	280	..	.	.	.	..	.	266	296	D	286
	Base of knee to sole	236		.	.	233	.	.	250	.	.	.	..	.	..	.	.	.	..	.	233	250	T	250
	Knee-bend to bend of foot	249		.	259	.	250	210	.	.	.	.	238	.	..	.	.	.	..	210	210	259	T	250
	Bend of foot to sole	34.4		.	37	33	31.2	35	.	.	.	35	..	.	..	.	.	.	..	.	31	37	¼ S	50 {Mid-knee to sole.
Arm.	Acromion to end of mid-finger	445·7		.	.	.	.	.	.	450	477	.	..	452	..	450	.	475	..	.	445	477	2¼ S	450
	Top of shoulder to end of mid-finger	437·6		.	.	.	435	420	.	.	.	430	437	.	432	.	.	.	..	438	432	438	1¼ S + ¾ T	437·5
	Top of shoulder to elbow	193·1		.	.	.	191	175	.	200	212	190	187	196	168 | 180	200	375	.	..	.	168	212	S	200
	Elbow to hand	141		150	.	134	144	140	.	150	159	140	150–158	145	144	150		.	150	144	139	159	½ D ¾ S	143 150
	Length of hand	103		100	.	115	100	105	93	100	106	100	100	111	108	100	00	100	100	105	93	115	½ S	100
	Length of foot	145·8	166·6	167	.	.	166	.	125	166	151	.	150	154	152	133	.	.	143–166	157	125	166	½ D ¾ S	143 Female. 150 Male

T stands for triangle; D for diameter; S for square; D T for diameter to its intersection by base of triangle.

No. 1.—COMPARISON of PROPOSED SYSTEM with other SYSTEMS, ANCIENT and MODERN.

MEASUREMENTS OF HEIGHT.		Zeising.	Vitruvius.	Varro.	Alberti.	Dürer.	Michael Angelo.	Cousin.	Lavater.	Schadow.	Montabert.	Salvage.	Quetelet.	Schmidt.	Perger.	Seller.	Hay.	Elster.	Carus.	Greatest Difference.		Proposed Canon.		
Head.	Top of head to centre of chin	124·6	125	.	.	125	122^5	125	125	.	.	125	.	..	125	125	125	125	.	122	125	½ T	125	
	Top of head to below chin	132·7	.	.	136·8	.	.	.	.	136	132	..	135	132	.	.	.	..	.	132	136	⅔ S	133⅓	
	Top of head, angle of shoulders	145·8	.	142·9	153	.	.	.	.	.	.	..	.	..	.	.	.	..	.	142	153	½ D	150	
	Hair to mid-chin	103·3	100	.	.	100	105	93·7	100	.	100	100	.	..	100	100	.	100	108	93·7	108	⅓ D	95⅓	
Neck.	Mid-chin to clavicle	47·4	.	.	.	.	.	31·2	50	52	.	..	.	..	.	.	.	..	.	31	52	⅓ S	66⅔	
	Mid-chin to breast-bone	55·7	.	42	.	.	70	.	.	.	50	..	.	..	.	.	65	42	52·6	42	70			
Body.	Clavicle to navel	209·8 223·	.	222	.	210	.	218	233	.	225	..	225	..	.	.	.	..	210	209	233	¾ D	214·5	
	Breast-bone to navel	201·4 214·5	.	.	.	.	210	.	.	.	.	..	.	..	.	.	212	187 218	.	187	218			
	Clavicle to mons veneris	299·8	.	.	.	296	.	.	.	.	.	..	.	..	.	.	.	300	.	296	300	1⅓ S	300	
	Clavicle to pubis	321	.	.	.	.	.	321	333	.	.	..	321	..	.	.	.	..	.	321	333	1⅛ D	321¾	
	Navel to pubis	111	.	111	116	.	105	125	100	.	.	125	94	96	100	.	98	..	105	94	125	1$\tfrac{1}{16}$ S	115	
Navel to Knee.	Navel to top of knee	300· | 313·1	.	.	.	.	.	.	.	.	.	300	.	..	.	.	.	300	.	300	313	1¼ S	300	
	Navel to mid-knee	313·1 | 326·2	.	.	.	.	.	.	.	.	310	..	318	324	.	.	.	..	.	310	326	1⅓ T	333⅓	
	Navel to knee-bend	321·2 | 334·3	.	333	.	.	.	.	.	.	.	..	.	..	.	.	.	..	.	321	334			
	Navel to base of knee	368·8 | 381·8	.	.	365	.	.	375	.	.	.	..	.	..	.	.	.	..	.	365	381	D + ⅓ T	369⅓	
	Head of thigh-bone to knee-bend	262	.	.	.	.	.	.	.	.	.	275	.	..	.	.	.	..	263	262	275	⅞ D D	252 286	Centre of patella. Mean 270. Base of patella.
Leg.	Top of knee to sole	304·8	.	.	.	.	.	.	.	.	.	300	.	..	300	.	.	300	.	300	304	D + ⅛ T	317¼	
	Mid-knee to sole	291·7	.	.	.	.	.	.	.	.	.	..	.	288	.	.	.	..	.	288	291	D	286	
	Knee-bend to sole	283·5	.	296	282	.	.	.	266	.	280	..	280	..	.	.	.	..	.	266	296	D	286	
	Base of knee to sole	236	.	.	233	.	.	250	.	.	.	..	.	..	.	.	.	..	.	233	250	T	250	
	Knee-bend to bend of foot	249	.	259	.	250	210	.	.	.	.	238	.	..	.	.	.	..	210	210	259	T	250	
	Bend of foot to sole	34.4	.	37	33	31.2	35	.	.	.	35	..	.	..	.	.	.	..	.	31	37	¼ S	50	Mid-knee to sole.
Arm.	Acromion to end of mid-finger	445·7	.	.	.	.	.	.	450	477	.	..	452	..	450	.	475	..	.	445	477	2¼ S	450	
	Top of shoulder to end of mid-finger	437·6	.	.	.	435	420	.	.	.	430	437	.	432	.	.	.	..	438	432	438	1¼ S + ¾ T	437·5	
	Top of shoulder to elbow	193·1	.	.	.	191	175	.	200	212	190	187	196	168 | 180	200	375	.	..	.	168	212	S	200	
	Elbow to hand	141	150	.	134	144	140	.	150	159	140	150–158	145	144	150		.	150	144	139	159	½ D ¾ S	143 150	
	Length of hand	103	100	.	115	100	105	93	100	106	100	100	111	108	100	00	100	100	105	93	115	½ S	100	
	Length of foot	145·8 | 166·6	167	.	.	166	.	125	166	151	.	150	154	152	133	.	.	143–166	157	125	166	½ D ¾ S	143 150	Female. Male

T stands for triangle; D for diameter; S for square; D T for diameter to its intersection by base of triangle.

No. 2.—COMPARISON of PROPOSED SYSTEM with other SYSTEMS, ANCIENT and MODERN.

	MEASUREMENTS OF HEIGHT.	Zeising.	Vitruvius.	Varro.	Alberti.	Dürer.	Michael Angelo.	Lavater.	Schadow.	Quetelet.	Schmidt.	Carus.	Cousin.	Salvage.	Montabert.	Hay.	Camper.	Perger.	Seiler.	Elster.	Flaxman.	Greatest Difference.		Proposed Canon.			
																								Figure 8 heads high.		Figure 7½ heads high.	
Head.	Head to roots of hair .	21	.	37	20	.	17·5	.	52	24	60	52·6	31·2	25	.	.	.	.	25	24	31¼	17	37	⅛ T	31¼	⅙ S	$33\frac{2}{6}$
Face.	Thence to orbit of eye .	34	33·3	Face.	66	33·2	35	33·3		34		.	31·2	25	.	.	.	33·3	25	33·3	31¼	25	35	⅛ T	31¼	⅙ S	$33\frac{2}{6}$
	Thence to base of nose .	34	33·3			33·3	35	33·3	75	38	36	35	31	75	.	.	35·2	33·3	75	33·3	31¼	33	38	⅛ T	31¼	⅙ S	$33\frac{2}{6}$
	Thence to chin . . .	34	33·3		.	33·3	35	33·3		.	.	39·2	31·2		.	.	.	33·3		33·3	31¼	31·2	39·2	⅛ T	31¼	⅙ S	$33\frac{2}{6}$
		143	99·9	.	.	99·8	122·5	99·9	127	96	96	126·8	124·6	125	.	.	.	99·9	125	123·9	125	106·2	149·2	..	125 = ⅛ Figure.		$133\frac{2}{6}$ = 1-7½ Figure
Upper Half of Body.	Cranium to clavicle . .	172 180	192	.	.	.	.	.	.	172	.	.	.	.	185	190	.	.	.	166·6	.	172	192	¾ T	186·5		
	Clavicle to navel . . .	209	.	214	.	.	210	233	.	225	.	210	.	.	.	.	.	.	.	.	.	209	233	¾ D	214·5		
	Navel to pubis . . .	111	.	111	116	.	105	100	.	94	96	105	125	125	.	98	.	100	.	.	.	94	125	½ D to T	111		
	Pubis to mid patella . .	214	.	.	.	.	210	200	.	224	228	.	.	.	.	.	.	.	.	.	.	200	228	¾ D	214·5		
	Chin to level of nipples .	132	.	.	.	.	.	.	.	.	.	.	125	125	.	141	.	.	.	.	125	125	141	½ T ⅔ S ½ D	125 Base of chin. 133 Centre of chin. 143 Diagonal measure.		
	Clavicle to pubis . . .	321	.	.	.	.	.	.	.	320	.	.	.	.	.	.	.	.	.	.	.	320	321	1⅛ D	321·6		
	Mid patella to inner maleolus	226	.	.	.	.	.	.	.	229	.	.	.	.	.	.	.	.	.	.	.	226	229	T	250		
	Thence to sole . . .	55	.	.	50	64	.	.	.	51	48	.	.	.	.	.	.	50	.	.	.	48	64	¼ S	50		
	Pubis to sole	507	498	.	.	.	.	.	.	504	516	.	500	.	.	.	500	.	.	.	500	498	516	2 T	500		
	Centre of knee to sole .	283	282	.	.	245	266	.	.	280	288	.	.	.	280	.	.	.	.	.	.	245	288	D	286		
	Sole to bottom of calf .	145	.	.	133·3	.	.	.	.	.	.	.	.	.	150	.	.	.	.	.	.	133	150	¼ D	143		
	Sole to end of fingers of hand hanging down .	381	.	.	381	.	.	.	.	.	.	.	375	.	.	.	.	.	.	.	.	375	381	1½ T	375		
	Sole to nipples . . . ,	742	.	.	.	.	.	.	.	.	.	.	.	750	720	.	.	.	.	.	.	720	750	3 T	750		
	Sole to acromion . . .	827	.	.	830	.	.	.	.	.	.	.	.	.	815	.	.	.	.	.	.	815	830	2 D to T	822 This measures from fontanella.		
	Sole to angle of neck and shoulders	854	.	.	847	.	.	.	.	.	.	.	.	.	840	.	.	.	g	.	.	840	854	3½ T 3 D	858 858		

No. 3.—COMPARISON of PROPOSED SYSTEM, with MEASUREMENTS from ANTIQUE STATUES.

		MEASUREMENTS OF HEIGHTS.	$7\frac{6}{8}$ Heads High, Apollo Belvidere.			7½ Heads.	7½ Heads.	Colossus of M'te Cavallo, by Phidias.	$7\frac{6}{8}$ Heads.	Standard Egyptian Statue.	Indian Measurement.	Gladiatore Borghese.	Theseus.	Greatest Difference.		Proposed System.				Venus de' Medici.
			As measured by Dr. Zeising.	As measured by Cl. Audran	As measured by Quetelet.	Grecian Peace.	Antinous.		Farnese Hercules.							8 Heads High.		7½ Heads High.		
Male Figure.		Head to roots of hair	23	32	29	21	57	21	28	62	31	..	..	21	32	⅛ T	31¼	⅙ S	$33\frac{2}{6}$	24
		Thence to orbit of eye	34	31	31	35		34	30		..	..	..	30	35	⅛ T	31¼	⅙ S	$33\frac{2}{6}$	33
		Thence to base of nose	34	33	32	35	34	34	30	37	..	..	..	30	37	⅛ T	31¼	⅙ S	$33\frac{2}{6}$	34
		Thence to centre of chin	34	32	35	35	34	34	..	..	..	..	..	32	34	⅛ T	31¼	⅙ S	$33\frac{2}{6}$	34
		Top of cranium to chin*	125	128	127	126	125	123	128	132	..	..	..	113	138	½ T	125	⅔ S = $133\frac{2}{6}$ †		125
	Body.	Chin to clavicle	57	..	..	55	55	51	..	..	52	..	..	51	57	⅕ D ¼ T	57 62½	.. ..		56 ..
		Top of cranium to angle of shoulders and neck	147	..	..	147	146	144	131	..	..	..	..	131	147	½ D	143	..		146
		Thence to top of ribs	145	..	..	145	144	145	..	..	..	..	..	144	145	½ D	143	250		145
		Thence to navel	91	..	..	104	93	95	..	..	..	..	..	91	104	½ D T	107			88
		Clavicle to navel	201	206	223	216	203	210	210	..	..	..	..	201	223	¾ D	214·5	..		199
		Angle of shoulders to navel	236	241	258	250	237	240	..	..	..	..	..	210	258	T	250	..		233
		Navel to pubis	111	106	102	113	114	111	111	111	..	..	..	102	114	½ D T	111	..		111
		Cranium to navel	383	356	372	397	383	384	371	..	..	..	..	356	397	S + ¾ T	387·5	..		379
	Legs.	Cranium to mid patella	708	674	690	707	714	700	697	..	..	..	..	674	714	3½ D	714	..		705
		Pubis to mid patella	214	214	216	216	214	215	215	210	..	..	..	210	216	¾ D	214·5	..		215
		Mid knee to sole	272	270	288	295	291	290	293	281	..	..	..	270	293	D	286	..		282 295
		Base of knee to above instep	256	234	252	257	257	255	257	..	..	..	..	234	257	T	250	..		260
		Total height	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	..	..	..	..	..	3½ D 4 T 5 S	1,000	..		1,000
	Arm from lower base of shoulder.	Head of humerus to base of biceps	169	334	338	170	167	334	..	..	..	..	..	167	170	⅔ T	166⅔	333⅓ {Female Figure.} 330		170
		Bend of arm to root of hand	165			168	167		..	..	..	..	..	165	168	⅔ T	166⅔			160
		Elbow to knuckles	100	..	101	..	101	103	..	..	..	..	..	100	103	S	100	..		..
		Arm from acromion to tips of fingers	434	..	445	..	435	437	..	..	..	..	..	434	445	2¼ S	450	..		..
	Arm from top of shoulder.	Shoulder to elbow	..	..	..	200	..	..	..	..	..	207	207	200	207	S	200	..		210
		Thence to knuckles	..	..	..	..	..	..	..	..	..	..	..	..	..	S	200	..		199
		Elbow to tips of fingers	..	..	..	..	..	..	..	..	..	..	..	..	..	1¼ S	250	..		..
		Whole arm from top of shoulder to tips of fingers	..	..	..	..	..	..	..	..	..	..	..	..	..	2½ S	450	..		..
		Length of face	102	96	98	105	..	102	..	..	115	..	..	96	115	½ S	100	..		101
		Length of foot	145	143	145	154	146	..	..	148	..	..	..	143	154	½ D ¾ S	143 150	.. ..		.. ..

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* These measures are not to the summit of the skull over the ear, but over the corner of the eye.

† This measure is to the summit of the skull over the ear.

No. 4.—COMPARISON of PROPOSED SYSTEM with other SYSTEMS, ANCIENT and MODERN.

MEASUREMENTS OF BREADTHS.	MALE FIGURE.																FEMALE FIGURE.								
	Zeising.	Alberti.	Dürer.	Cousin.	Lavater.	Schadow.	Gerdy.	Salvage and Flaxman.	Quetelet.	Schmidt.	Carus.	Hay.	Greatest Difference.		Proposed System.		—	Zeising.	Schadow.	Dürer.	Cousin.	Salvage.	Venus de' Medici.	Present System.	
Head across cheek-bones	95	.	100	.	100	.	93·6	.	.	96	.	.	93	100	⅓ D	95⅓	..	.	.	.	.	.	.	..	..
Head across mid nose	78	.	83	.	.	.	78	.	.	.	.	.	78	83	⅓ T	83⅓	..	.	.	.	.	.	.	..	..
Neck—mid-way	68	67·2	62·5	62	.	67·6	62·4	.	69	.	.	.	62	69	⅓ S ¼ D	66⅔ 71½	..	.	.	58·7	.	.	62	¼ T	62½
Across acromion	222	.	174·6 166	.	.	.	.	.	.	210	210·4	228	174	228	¾ D	214⅓	..	.	.	166	.	.	.	⅔ T	166⅔
Breadth of shoulders across fontanella	248	249	.	250	250	235	.	250 S.	.	.	.		235	250	T	250	..	.	.	216	.	.	187	¾ T	187
Utmost breadth of shoulders	290	.	255	.	.	272	.	300	.	.	.	.	250	300	D	286	..	248	.	242·7	.	200	250 260	T	250
Armpits, or outer angle of pectorals	180 206	187	166·6	.	.	.	187	.	176	.	.	.	176 206	187	Armpits ¾ T Pectorals Sq.	187 200	..	.	.	166	.	.	165	⅔ T	165
Across nipples	128	.	111	.	125	143	.	S. 150	.	132	122	125	111	150	½ D	143	..	.	115	.	.	125	126	½ T	125
																	Ribs under Bosom.	.	.	.	.	.	166	⅔ T	166
Waist	154	.	156	.	151	150	156	156	.	.	.	156	150	160	¾ S ⅔ T	150 166	.. ..	145 .	135 142	193 150	. .	. .	148 .	½ D ..	143 ..
Hips: Across spine of ilium	180	182	166 174·2	187 157	.	.	.	187	.	.	.	.	157	187	¾ T	187	..	196 to 222	.	200 227	250	.	200	Sq.	200
Hips: Across utmost breadth	196	.	190	197	200	.	187	.	192	192	.	.	190	200	⅔ D	190⅔							214	¾ S	214
Thigh—half-way from pubis to top of upper patella	90	83·5	90	93	.	.	93	94	.	.	.	.	83·5	94	⅓ D	95⅓	..	.	.	.	.	.	100	½ S	100
Knee	55	50·3	52	55	.	60·6 64⅓	.	.	.	60	.	.	50	60	¼ T	62½	..	.	63	.	.	.	66	¼ T ⅓ S	62½ 66⅔
Calf	72	50·3	66·3	71	75	71⅓	62	62½	.	72	.	.	50	75	¼ D ⅓ S	71½ 66⅓	..	.	.	62·5	.	.	66½	⅓ S	66⅔
Ankle—narrowest part	34	33·5	31·2	31·3	.	35	.	31¼	.	.	.	.	.	.	⅛ D ⅙ T	35⁶⁄₈ 41⅔	..	.	.	27·1	.	.	37½	⅛ D	35¾
Breadth of foot	55	66·6	62·5	58	66·6	62	.	.	57	54	.	.	53	66	¼ T	62½	..	.	.	58·8	.	.	54	¼ D T	54
Greatest breadth of upper arm	55	66·6	41·6	·	66·6	67	.	62⅔	.	.	.	.	41·6	67·6	⅓ S ¼ T	66⅓ 62½	..	.	.	40	.	.	54	¼ T ¼ S	62½ 50
Smallest	45	·	38·5	42	·	·	46·8	47	.	.	.	.	38·5	47	¼ S	50	..	.	.	37	.	.	46	..	..
Greatest breadth of lower arm	55	50	52·6	.	66·6	61	.	.	.	.	.	.	50	66·6	¼ T	62½	..	.	.	47	.	.	57	¼ T ⅕ D	62½ 57⅗
Hand with thumb	55	67·2	62·5	.	.	.	62	.	53	54	.	.	53	67·2	¼ T	62½	..	.	.	55	.	.	51	¼ S	50

No. 5.—Comparison of Proposed System with Antique Statues.

BREADTHS IN FRONT.	MALE FIGURE.														FEMALE FIGURE.					
	Apollo Belvidere.			Antinous.																
	As measured by Zeising.	As measured by Audran.	As measured by Quetelet.	As measured by Zeising.	As measured by Quetelet.	Greek Peace.	Colossus of M'te Cavallo.	Farnese Hercules.	Egyptian Standard.	Apollino, measured by Clarac.	Theseus by Schadow.	Glad. Borghese, by Schadow.	Proposed System.		Venus de' Medici, as measured by Schadow and Zeising.	Venus de' Milo.	Cousin.	Zeising.	Proposed System.	
Breadth of neck	64	63	71	68	66	70	72	..	..	..	..	..	⅓ S ¼ D	66⅓ 71½	62	..	..	..	¼ T	62½
On level with top of sternum	..	..	..	..	238	258	302	332	..	..	..	..	T	250	..	..	..	..	¾ D	214
Utmost breadth of shoulders	290	..	..	..	..	..	..	..	286	298	286	286	D	286	250	250 260	187	248	T	250
Across pectorals to armpits	204	..	192	202	199	210	220	230	192	..	..	..	S	200	165	166 172	..	..	⅔ T ¾ T	166 187
Between nipples	135	119	159	150	..	135	..	155	135	..	..	143	½ D	143	126	126	..	..	½ T	125
Breadth under bosom	185	..	..	185	..	192	192	220	190	187	193	..	¾ T	187	166	..	..	..	⅔ T	166
Waist	153	159	159	158	167	170	180	190	166	163·5	..	..	¾ S ⅔ T	150 166	148	..	156	145	½ D	143
Hips, on a level with hip-bone	170	..	187	172	..	185	200	210	187	..	189·5	..	¾ T	187	196 s. 187 z.	..	..	..	S	200
Utmost breadth of pelvis	182	..	..	192	194	201	230	225	208	198·4	..	..	⅔ D S	190⅔ 200	214 s. 222 z.	..	250	222	T ¾ D	250 214·5
Thigh, mid-way	95	..	..	91	..	91	115	110	96	83	..	..	⅓ D	95½	100	..	..	..	½ S	100
Thigh, above knee	..	..	..	..	..	..	..	..	..	..	..	..	⅓ S	66½	..	..	..	..	..	..
Breadth of knee	56	..	..	58	..	64	68	68	66	65 above 62½ middle 57 below	61	57·3	¼ T	62½	60	66	..	..	¼ T	62½
Centre of calf	70	..	..	72	..	71⅔	76	81	73	70	71⅔	75	¼ D ⅓ S	71½ 66⅔	70 s. 72 z.	72	..	..	⅓ S ¼ D	66⅔ 71½
Below calf	..	..	..	..	..	..	..	..	..	57	..	..	¼ T	62½	..	..	..	..	..	..
Ankle—narrowest part	33	..	..	34	..	36	35	38	..	39	..	..	⅛ D ⅙ T	$35\frac{6}{8}$ 41⅔	38 z. 39 s.	39	..	..	⅛ D ⅙ T	$35\frac{6}{8}$ 41⅔
Breadth of foot	52	..	47	54	55	60	63	62	62	..	..	64⅓	¼ T	62½	54	..	..	..	¼ D T	54
Greatest breadth of upper arm	54	..	..	53	..	60	70	80	67	67	..	71⅔	¼ D ⅓ S ¼ T	71½ 66⅔ 62½	54	..	..	..	¼ T ¼ D T	62½ 54
Narrowest part of upper arm	48	..	..	48	..	46	52	60	..	..	..	..	¼ T	62½	46	..	..	..	¼ S	50
Greatest breadth of lower arm	56	..	..	56	..	54	64	70	62	57	..	62	¼ T	62½	55	..	..	..	¼ S	50
Breadth of hand and thumb	61	..	..	54	55	64	64	70	..	..	...	..	¼ T	62½	51	..	..	..	¼ S	50
Across malleoli	..	..	..	..	..	40	..	..	..	..	50	57⅓	⅙ D ⅙ T	47⅔ 41⅔	..	..	..	..	..	..
Wrist	..	..	..	..	..	..	..	..	..	36·5	..	43	⅙ T ⅛ D	41⅔ $35\frac{6}{8}$	30	..	..	..	⅛ D	$35\frac{6}{8}$

No. 6.—COMPARISON of PROPOSED SYSTEM with ANTIQUE STATUES.

PROFILE.—DEPTHS.	Zeising.	Dürer.	Apollino by Clarac.	Egyptian Antinous.	Flaxman.	Gerdy.	Cousin.		Gladiator Borghese.	Paix des Grecs.	Theseus.	Colossus of M'te. Cavallo.	Schadow.	Greatest Difference.		Proposed System.	
Depth of head	124	127	..	125	125	..	..	..	..	..	..	..	..	124	125	½ T	125
Orifice of ear to forehead Orifice of ear to chin Orifice of ear to back head	76	..	..	..	..	..	..	..	..	..	..	..	..	76	84	⅓ T	83⅓
Depth of chest	170	146	148·3	150	156	156	156	..	150	..	..	..	..	150	170	¾ S	150
Below breast	..	139	148·3	146	..	140·5	..	..	..	..	..	..	..	140·5	148·3	½ D	143
Waist	111	111	..	118	104·2	..	..	..	114	..	..	..	114	104·2	114	½ D T	107·5
Rump to pubis	145	123	146 148	145	125	156	..	..	143	..	..	..	129	125	156	½ D	143
Back to belly at navel	111	116	114·5	..	..	..	125	..	..	..	..	..	..	111	125	½ T	125
Fold under buttocks to pubis	111	100	119	120	..	..	..	..	..	..	..	..	..	111	119	½ D T	107·5
Mid thigh	103	94	106	103	109	93·6	93·6 101·5	..	107	..	100	..	100	93·6	107	½ S	100
Above knee	60	73	73	72	62	..	..	..	71⅔	..	..	..	..	60	73	¼ D	71½
Mid knee	..	61	..	66·5	62·5	...	..	..	..	..	..	..	..	62·5	66·5	⅓ S	66⅔
Below knee	55	..	56	..	..	..	..	..	..	..	..	..	..	55	56	¼ T	62⅔
Calf	81	72	73	71·3	62·5	70	70	..	75	..	75	..	78	62·5	81	¼ D	71½
Below calf	55	61	58·5	67	..	..	55	..	..	..	..	..	..	55	66	⅓ S ¼ T	66⅔ 62½
Ankle—narrowest part	42	..	49·7	50	..	..	42	..	50	..	..	..	47⅔	42	50	¼ S	50
Sole to angle of instep	..	..	..	72	..	..	46	..	..	..	..	..	..	..	..	¼ D	71½
Length of foot	166	161	156	143	135	..	..	..	164	157⅔	..	..	..	135	166	¾ S ½ D	150 male. 143 female.
Pubis to os coccygis, or hollow of buttocks	..	..	125	..	..	..	..	..	..	..	..	..	..	125	..	½ T	125
Upper arm, across deltoid Upper arm, under deltoid	..	62	..	72	62·5	62	62	..	71⅔	..	..	71½	..	62	71⅔	¼ D ⅓ S ¼ T	71½ 66⅔ 62½
Lower arm—broadest part	..	..	..	62·5	47	46	52	..	62	..	..	..	..	46	62	¼ T ⅙ D	62½ 47⅙
Wrist in profile	..	..	..	41	31¼	..	81¼	..	43	..	..	..	35⅔	31¼	43	⅙ T ⅛ D	41⅔ 35¾

No. 7.—Comparison of Proposed System with Ancient Statues.

FEMALE FIGURE. — PROFILE DEPTHS.	Venus de' Medici, as measured by Schadow.	Venus de' Medici, as measured by Story.	Venus of Milo.	Schadow.	Durer.	Proposed System.	
Neck	62	62½	66	..	56⅓ 66⅔	¼ T ⅓ S	62½ 66⅔
Bosom to back	135	143	..	139	133	½ D	143
Under bosoms*	131 135	125	..	..	122	½ T ⅔ S	125 133
Waist	101 108	100 107	116	100	105½	½ D to T ½ S	107 100
Bottom of abdomen to back	..	133	..	..	..	⅔ S ½ D	133 143
Buttocks*	139 147	143	147	..	155⅓ 166⅔	½ D	143
Beneath buttocks	108	108	108	..	127½	½ D to T	107½
Across thigh	..	..	..	..	..		
Above knee*	71½ 77	73	77	73	77⅔	¼ D	71½
Mid knee	71	71½	..	..	66⅔	¼ D	71½
Below knee	77	67	69	62	..	⅓ S	66⅔
Calf	73	73	73	69	72⅔	¼ D	71½
Ankle—narrowest part	46½	47⅔	46½	42	39	⅙ D ⅙ T	47⅔ 41⅔
Length of foot	139	150	..	..	155	¾ S	150
Sole to above instep at bend of foot	..	..	..	..	..	⅙ T	41⅔
Profile Arm :—							
Upper arm across deltoid	69½	71½	77	..	82	¼ D	71½
Base of deltoid	62	62½	..	..	66⅔	¼ T	62½
Mid arm, across biceps	..	62½	..	..	..	¼ T	62½
Elbow	51	50	51	46½	44⅓	¼ S	50
Lower arm	56	56	57	55	44⅓	⅕ D	57½
Mid-way to wrist	..	50	..	..		¼ S	50
Wrist—broadest part	34	35½	38	..	33 27½	⅛ D	35½
Hand and thumb	46 51	50	..	..	..	¼ S	50

FEMALE FIGURE. — FRONT BREADTHS.	Venus de' Medici, as measured by Zeising.	Venus de' Medici, as measured by Schadow.†	Venus of Milo.	Cousin.	Zeising.	Schadow.	Proposed System.	
Neck	62	..	63	..	..	63	¼ T	62½
Across humeri	..	220	..	..	..	189	¾ D	214
Shoulders—utmost breadth	260	248	250 260	187	248	233 248	T	250
Armpits	..	..	..	..	..	..	⅔ T	166
Pectorals	165	..	166 172	..	..	..	⅔ T	166
Bosom	165	..	..	..	..	..	⅔ T ¾ S	166 150
Nipples	126	..	126	..	..	115	½ T	125
Under bosoms	166	161	..	..	..	155	⅔ T	166
Waist	148	149	..	156	145	141¾	½ D	143
Above hips	187	196	..	..	..	..	S	200
Utmost breadth of pelvis	222	214½	..	250	..	204½	¾ D	214
Above crest of ilium	..	173¼	..	..	..	161 178	¾ T	186
Thigh at pubis	..	..	..	..	..	..	½ D to T	107
Mid thigh	100	..	..	..	..	..	½ S	100
Mid knee	60	70	68	..	..	63	⅓ S	66⅔
Under knee	..	..	..	..	..	..	¼ T	62½
Mid calf	72	70	70	..	..	66¾ 65¾	⅓ S ¼ D	66⅔ 71½
Ankle—narrowest part	38	39	..	..	..	35¾ 36½	⅛ D	35⅝
Malleoli	..	43	46	..	..	42 43	⅙ T	41⅔
Breadth of foot	54	..	..	..	..	..	¼ D T	53½
Arm :—								
Armpit to base of deltoid	..	..	..	..	..	..	¼ S	50
Mid arm	46	..	..	..	..	..	¼ S	50
Utmost width lower arm	57	..	..	..	..	..	¼ T	62
Midway to wrist	..	..	..	..	, ..	..	¼ S	50
Wrist—narrowest part	31	31	..	..	..	..	⅛ T	31¼
Hand	100	..	18	..	..	..	½ S	100

* Both measures are given.

† The measures by Zeising and Schadow of the Venus are only approximative. See Table 4 for the measures of breadth according to my measurements from this statue.

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